

Our ref: L.1231.001.00_SmithfieldRSL_FIA_Masterplan.docx

2 September 2024

Colliers International Engineering & Design NSW Pty Ltd
Office Suite 7.01, Level 7 3 Rider Boulevard
Rhodes NSW 2138

Attention: Tim Fitzhardinge

Dear Tim,

RE: FLOOD IMPACT MODELLING FOR THE PROPOSED DEVELOPMENT OF SMITHFIELD RSL

BMT Commercial Australia Pty Ltd (BMT) has been engaged by Smithfield RSL Pty Ltd (via Colliers International Engineering & Design NSW Pty Ltd) (Colliers) to conduct a Flood Impact Assessment (FIA) for the proposed redevelopment of Smithfield RSL Masterplan, located at Neville Street Smithfield, NSW 2164 (the "Site"). The Site, with a total area of approximately 4.2 hectares, falls within the Fairfield City Council (Council) Local Government Area (LGA) and is predicted to be affected by overland flow flooding. As a result, the proposed development must be assessed in accordance with the flood-related development controls specified in Chapter 11 of the Fairfield City Wide Development Control Plan (DCP) 2024. The following letter report documents the methodology and findings of the modelling and considers overland flow flood conditions only.

Please note that the modelling and resultant impact mapping was prepared in accordance Council's '*Developer Agreement*'. This agreement allows BMT to provide technical advice and model the impact of the proposed development on flooding based on Council's existing flood model. However, BMT cannot assess the development against flood-related development controls nor provide any opinion concerning the adequacy of any development proposals. The assessment of the development against any flood-related controls will not be addressed in this letter and should be carried out by a separate, suitably qualified hydraulic engineer.

Hydrologic and Hydraulic Modelling Overview

Hydraulic modelling was conducted using the latest version of the Smithfield catchment model provided by Council, developed as part of the '*Smithfield Catchment Management Plan*' (BMT, 2017), referred to hereafter as the "2017 SCMP". While this study has not yet been adopted by the Council, the Council has directed that the modelling be conducted using this latest model.

The TUFLOW hydraulic rainfall-on-grid model from the 2017 SCMP was developed using the XP-STORM model from the '*Smithfield Overland Flood Study*' (SKM, 2011). The 2017 SCMP TUFLOW model uses a 2m grid resolution, incorporates the majority of the drainage network within the catchment with blockage applied. Building footprints are modelled as local areas of increased hydraulic roughness to represent the effect of buildings on the passage of overland flow. Where building footprints are located, the rainfall is applied to the building footprint perimeter rather than to the footprint. The model was run using TUFLOW version 2013-12-AB. Results were filtered to exclude floodwater with depths less than 0.15m and to remove flood islands smaller than 100 m². The existing hydrologic model inflows were maintained for use in this assessment.

The 2017 SCMP TUFLOW hydraulic model has been updated as needed to reflect detailed site-specific information to assess flood behaviour under '*existing conditions*' and '*post-development conditions*' for the 1% Annual Exceedance Probability (AEP), 1% AEP with Climate Change, and Probable Maximum Flood (PMF) events. The critical durations for the Site were identified as 15-minute, 90-minute, and 120-minute for the 1% AEP event (including the 1% AEP Climate Change), and 30-minute, 60-minute, and 90-minute for the PMF event.

Modelling of Existing Conditions

In order to reliably define flood conditions at the Site and provide a more robust baseline case from which to assess flood impacts, the following updates were made to the Existing Conditions model:

- Modification of terrain representation was included within the vicinity of the Site based on the survey data provided by Colliers (reference "675-22G T01 [00] RO.dwg", dated 31/10/2022).
- Material Manning's n within the Site were modified based on latest aerial topography and existing survey information. The adopted values were selected to be in line with the 2017 SCMP.
- Digitisation of buildings in the area of the Site were reviewed and updated based on latest aerial and site survey information.
- Stormwater network with the Site has been updated based on survey data provided by Colliers (reference "675-22G T01 [00] RO.dwg", dated 31/10/2022).

Modelling of Post-development Conditions

Figure 1.1 shows the proposed development Masterplan provided by Colliers. The following associated data is included:

- Civil works drawings for the proposed Masterplan (reference: "20240809_124-23C-PP-REV B.pdf", dated 09/08/2024). This includes the general buildings arrangement as shown in Figure 1.1. Colliers has confirmed that all buildings will be constructed with solid slab to the proposed finished floor level (i.e. no water is able to enter the building footprints).
- Design TIN for the entire Site and internal roadways as shown in Figure 1.2 (reference: "240715_tin_DESIGN.dem", dated 15/07/2024).
- DRAINS model for the proposed drainage design (reference: "124-23_CONCEPT_007.drn", dated 15/07/2024).
- Drawing and details of proposed flood storage tank (including stormwater network, inverts and size).

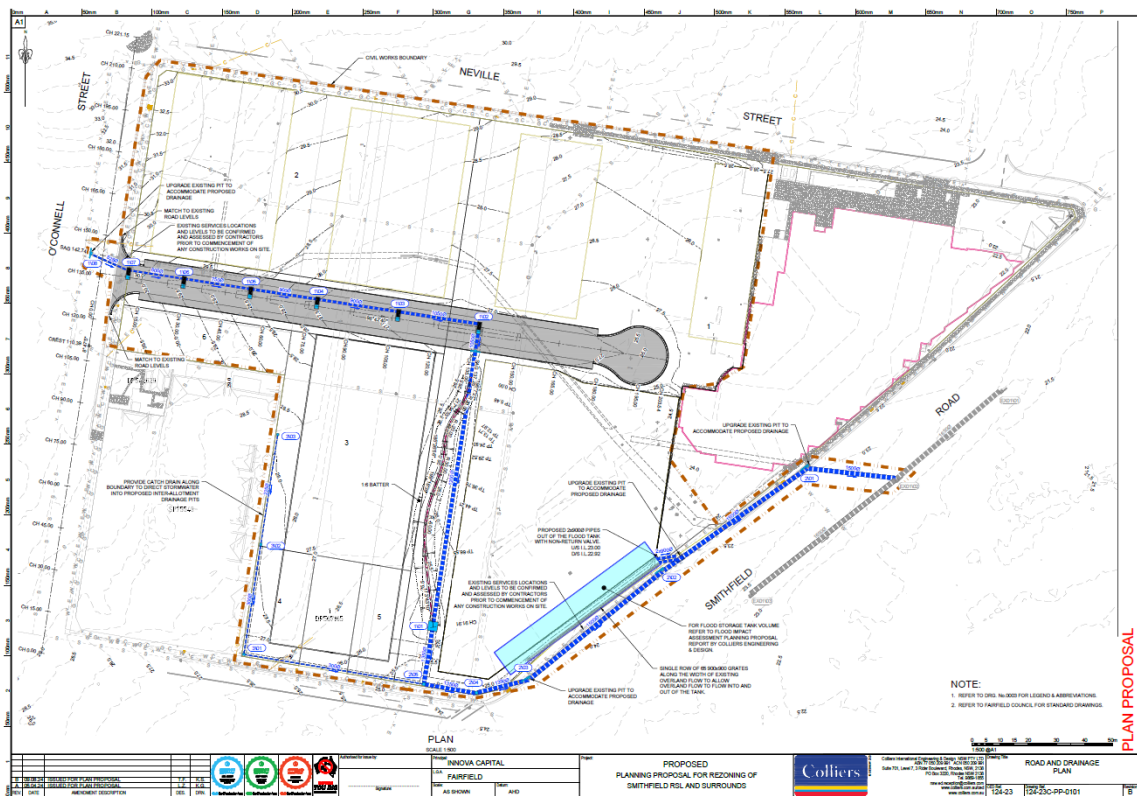


Figure 1.1 Proposed Masterplan (ref:"20240809_124-23C-PP-REV B.pdf", dated 09/08/2024)

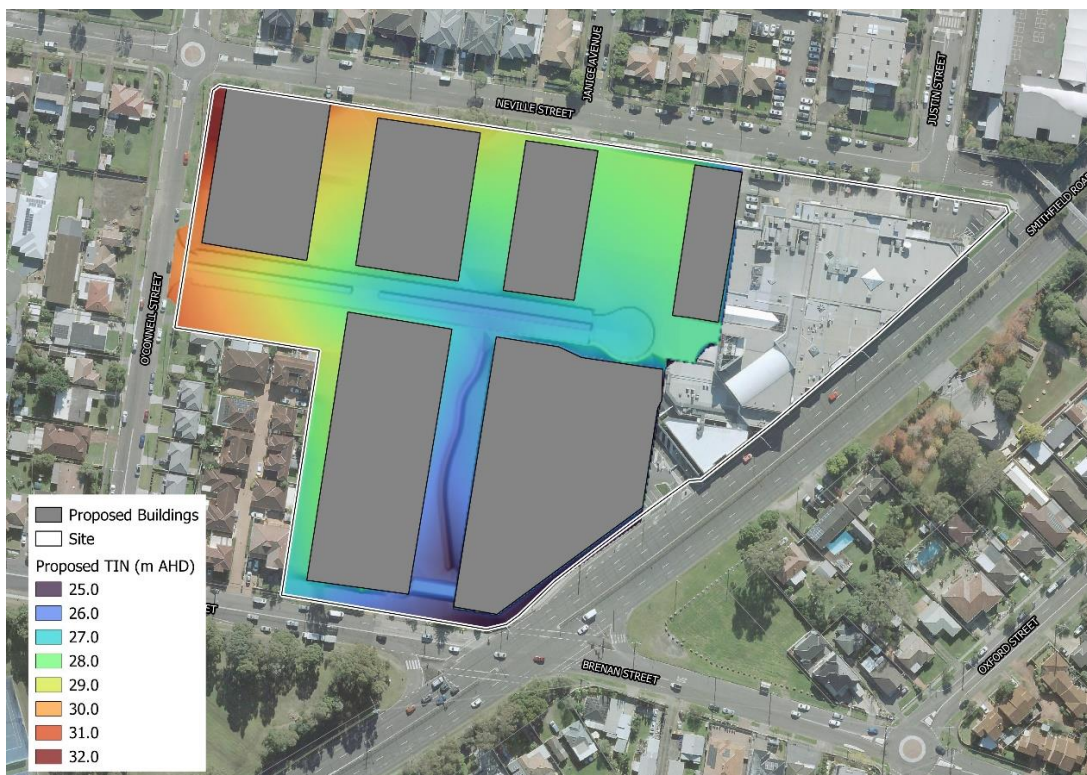


Figure 1.2 Proposed post-development ground level design (ref:"240715_tin_DESIGN.dem", dated 15/07/2024).

The following modifications were made to the Existing Conditions TUFLOW model to form the Post-development Conditions TUFLOW model for this assessment:

- Topography within the Site was updated based on the provided design TIN. All proposed buildings have been raised above the PMF Flood Level.
- No rainfall is applied to the building footprints. Instead, the rainfall is applied around the border of the footprint which is in line with the methodology used in the 2017 SCMP. The applied rainfall was directed to sides of the building based on the pitched roof design provided by Colliers.
- Manning's n roughness within the Site was updated to reflect the proposed land use.
- Proposed stormwater drainage network across the Site and adjacent to Smithfield Road was included as a 1D layer linked to the 2D TUFLOW model domain, with details of the networks as extracted from the provided DRAINS model. Blockages have been applied as per Council's model.
- The flood storage tank was modelled as a series of multiple 900mm x 900mm grated pits distributed along a 65m length. These pits discharge into a 1D node storage with a tank capacity of 500m³. The stored water is then discharged through two 900mm culverts, each modelled with a non-return valve.

Model Simulations

Flood conditions for the 1% AEP, 1% AEP with 30% Rainfall Increase (Climate Change event) and PMF events were determined by simulating the Existing and Post-development Conditions TUFLOW models and assessing an ensemble of design storm durations. It is noted that BMT has been requested by Colliers, following the direction of the Council, to include the climate change event modelling scenario in this assessment. The results of these simulations were combined into design flood envelopes and filtered (same method as the 2017 SCMP) that served as the basis for flood and impact mapping.

Flood Modelling Results and Mapping

Peak flood levels and depths have been extracted for a number of key locations in the vicinity of the Site for the "existing flood conditions" and "post-development flood conditions". The locations are shown on Figure 1.3 and the results are presented in Table 1.2 and Table 1.3.



Figure 1.3 Reporting locations

Table 1.2 Peak flood level results at reported locations

ID	Existing Conditions			Post-development Conditions			Difference in Flood Levels “++” was dry now wet “//” was wet now dry		
	1% AEP	1% AEP + CC	PMF	1% AEP	1% AEP + CC	PMF	1% AEP	1% AEP + CC	PMF
A	-	-	30.26	-	-	30.76	0.00	0.00	0.50
B	-	-	29.79	-	29.23	29.35	0.00	++	-0.44
C	-	-	27.44	27.19	27.23	27.37	++	++	-0.07
D	-	-	26.61	26.71	26.77	27.17	++	++	0.55
E	-	-	-	25.98	26.04	26.64	++	++	++
F	-	-	-	-	-	25.63	0.00	0.00	++
G	24.74	24.77	24.87	24.75	24.80	24.94	0.01	0.03	0.06
H	-	-	28.16	-	-	27.94	0.00	0.00	-0.22
I	-	23.98	24.25	-	-	24.17	0.00	//	-0.08
J	23.11	23.14	23.27	-	-	23.28	//	//	0.01
K	-	23.92	24.02	23.91	23.94	24.08	++	0.02	0.06
L	30.79	30.82	30.93	30.79	30.82	30.93	0.00	0.00	-0.01
M	24.98	25.01	25.10	25.00	25.02	25.20	0.01	0.02	0.10

Table 1.3 Peak flood depth results at reported locations

ID	Existing Conditions			Post-development Conditions			Difference in Flood Depths “++” was dry now wet “//” was wet now dry		
	1% AEP	1% AEP + CC	PMF	1% AEP	1% AEP + CC	PMF	1% AEP	1% AEP + CC	PMF
A	-	-	0.19	-	-	0.32	0.00	0.00	0.13
B	-	-	0.25	-	0.18	0.28	0.00	++	0.03
C	-	-	0.18	0.20	0.24	0.38	++	++	0.21
D	-	-	0.24	0.27	0.33	0.73	++	++	++
E	-	-	-	0.27	0.32	0.92	++	++	++
F	-	-	-	-	-	0.21	0.00	0.00	0.21
G	0.21	0.24	0.34	0.22	0.27	0.41	0.01	0.03	0.06
H	-	-	0.18	-	-	0.25	0.00	0.00	0.07
I	-	0.27	0.54	-	-	0.46	0.00	//	-0.08
J	0.20	0.23	0.36	-	-	0.37	//	//	0.01
K	-	0.22	0.33	0.22	0.25	0.39	++	0.02	0.06
L	0.26	0.29	0.40	0.26	0.29	0.40	0.00	0.00	-0.01
M	0.21	0.23	0.32	0.22	0.25	0.43	0.01	0.02	0.10

The change in peak flood level, velocity and velocity-depth maps provide a visual representation of the differences between the Existing and Post-development Conditions. The difference maps were created by subtracting results for the Existing Conditions from the results for the Post-development Conditions. Note that filtering of results has been undertaken by removing areas with depths below 0.15m and removing flood island > 100m², in line with the 2017 SCMP. Flood level impacts have been mapped at 0.01 m intervals, as per Fairfield City Council's requirements for Developer Agreement assessments. The maps identify areas where:

- Flooding previously occurred in the existing condition model but no longer occurs in the post-development condition model (referenced as “was wet now dry”);
- Flooding now occurs in the developed scenario model which was previously not flooded in the existing scenario model (referenced as “was dry now wet”); and
- Extent and degree of changes in flood level, velocity and VxD associated with the proposed Masterplan development.

Under the Post-Development Conditions, most of the site lies outside the 1% AEP flood extent. On-site inundated areas are characterised by shallow depths of approximately 0.15m to 0.3m and low velocities of up to 1m/s, occurring within the designed overland channel at the Site.

Figure C-01 shows an increase in flood levels off-site at the intersection of Smithfield Road and Brenan Street, southeast of the Site, with up to 20mm during the 1% AEP event. In the 1% AEP Climate Change event, flood levels and extents increase by up to 35mm at this location. The PMF results also indicate a rise in flood levels of approximately 20mm along residential properties south of Brenan Street.

A range of flood mapping has been provided in the attached annexes as follows:

Annex A – Existing Flood Conditions

- A-01: Peak Flood Depth and Level - 1% AEP Event - Existing Conditions
- A-02: Peak Flood Depth and Level - 1% AEP Event with Climate Change - Existing Conditions
- A-03: Peak Flood Depth and Level - PMF Event - Existing Conditions
- A-04: Peak Flood Velocity - 1% AEP Event - Existing Conditions
- A-05: Peak Flood Velocity - 1% AEP Event with Climate Change - Existing Conditions
- A-06: Peak Flood Velocity - PMF Event - Existing Conditions
- A-07: Peak Flood VelocityxDepth Product - 1% AEP Event - Existing Conditions
- A-08: Peak Flood VelocityxDepth Product - 1% AEP Event with Climate Change - Existing Conditions
- A-09: Peak Flood VelocityxDepth Product - PMF Event - Existing Conditions
- A-10: Flood Risk Precinct – Existing Conditions

Annex B – Post-development Flood Conditions

- B-01: Peak Flood Depth and Level - 1% AEP Event - Post-dev Conditions
- B-02: Peak Flood Depth and Level - 1% AEP Event with Climate Change - Post-dev Conditions
- B-03: Peak Flood Depth and Level - PMF Event - Post-dev Conditions
- B-04: Peak Flood Velocity - 1% AEP Event - Post-dev Conditions
- B-05: Peak Flood Velocity - 1% AEP Event with Climate Change - Post-dev Conditions
- B-06: Peak Flood Velocity - PMF Event - Post-dev Conditions
- B-07: Peak Flood VelocityxDepth Product - 1% AEP Event - Post-dev Conditions
- B-08: Peak Flood VelocityxDepth Product - 1% AEP Event with Climate Change - Post-dev Conditions
- B-09: Peak Flood VelocityxDepth Product - PMF Event - Post-dev Conditions
- B-10: Flood Risk Precinct – Post-dev Conditions

Annex C – Peak Flood Impacts

- C-01: Peak Flood Level Impact - 1% AEP Event
- C-02: Peak Flood Level Impact - 1% AEP Event with Climate Change
- C-03: Peak Flood Level Impact - PMF Event
- C-04: Peak Flood Velocity Impact - 1% AEP Event
- C-05: Peak Flood Velocity Impact - 1% AEP Event with Climate Change
- C-06: Peak Flood Velocity Impact - PMF Event
- C-07: Peak Flood VelocityxDepth Impact - 1% AEP Event
- C-08: Peak Flood VelocityxDepth Impact - 1% AEP Event with Climate Change
- C-09: Peak Flood VelocityxDepth Impact - PMF Event

As per Council's Developer Agreement, BMT cannot make a statement about the adequacy of the design.

Should you require any additional information, please contact the undersigned.

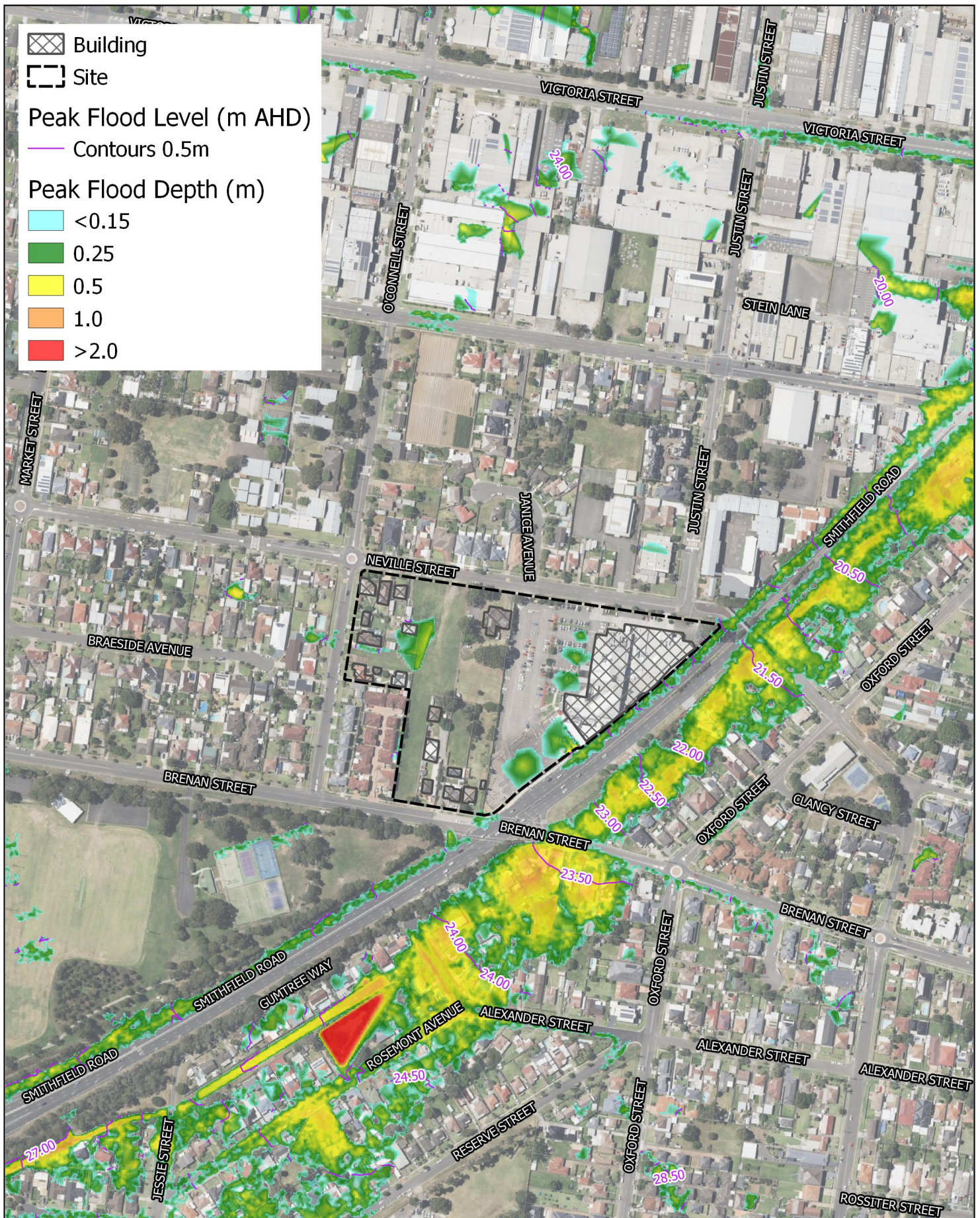
Yours Sincerely,

BMT

A handwritten signature in black ink, appearing to read 'Nam Nguyen', with a stylized flourish extending to the right.

Nam Nguyen
Engineer

Annex A Existing Flood Conditions



Title:

Peak Flood Depth and Level - 1% AEP Event - Existing Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

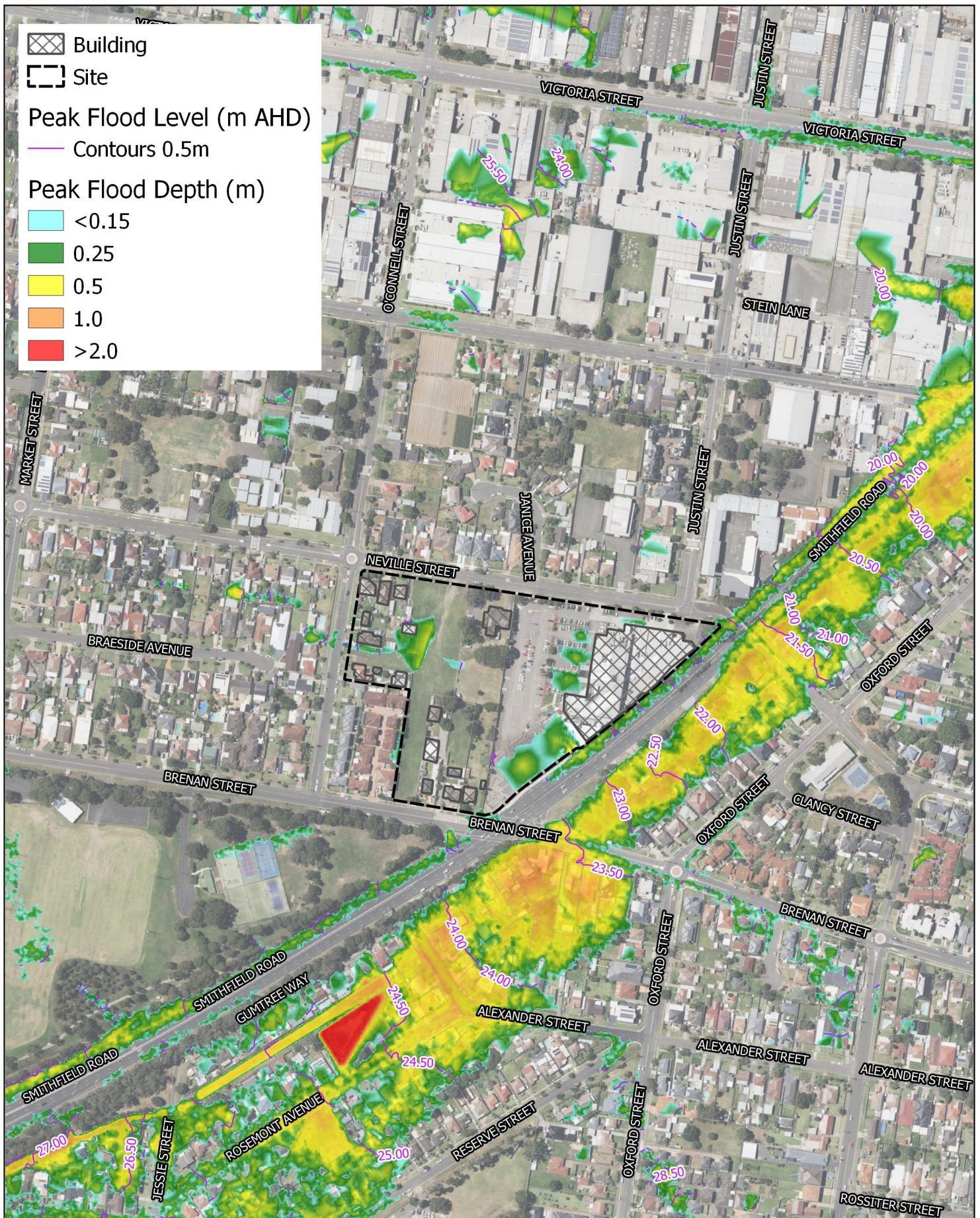
A-01

Rev:

-



www.bmt.org



Title:

Peak Flood Depth and Level - 1% AEP Event with Climate Change - Existing Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

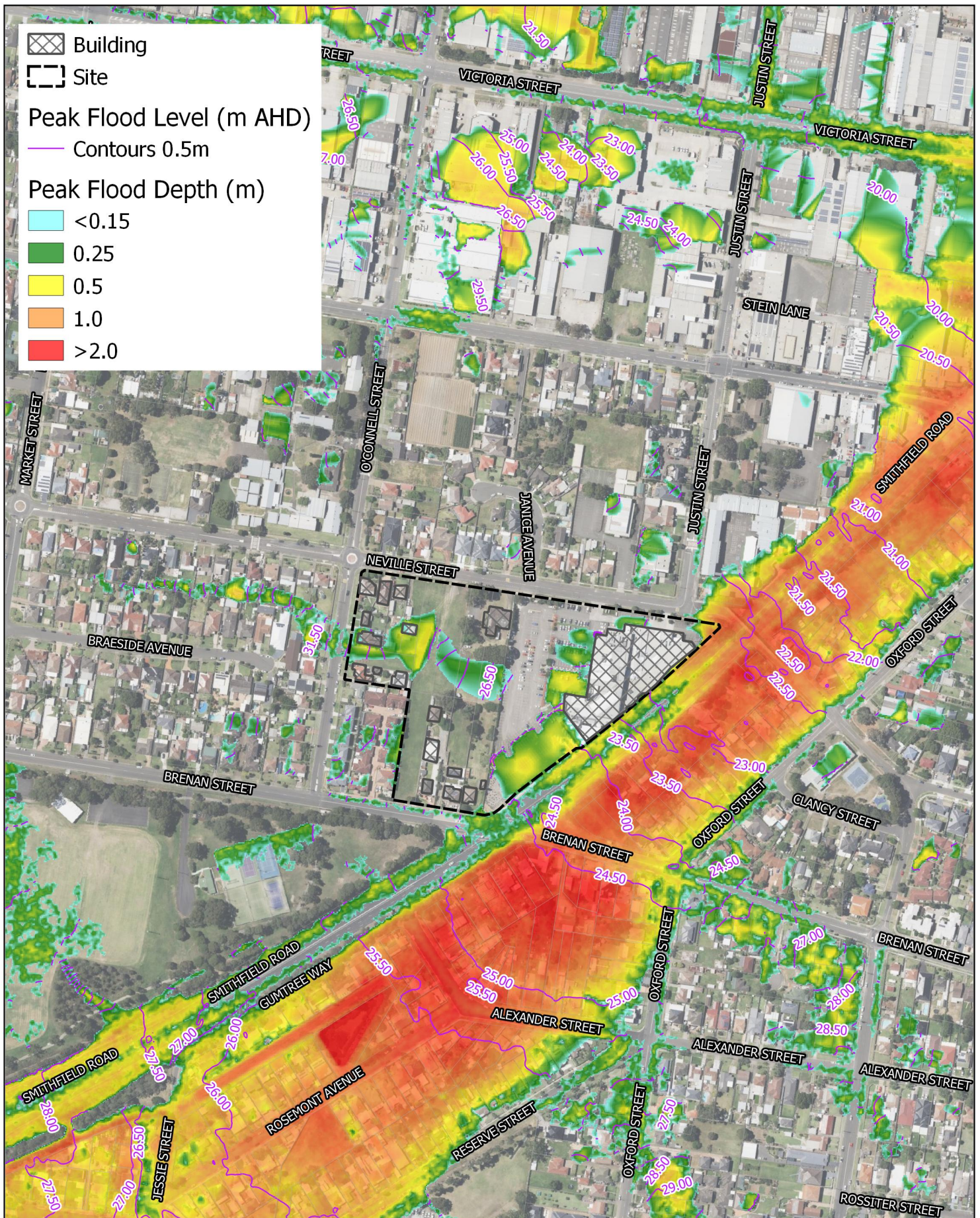
A-02

Rev:

-



www.bmt.org



Title:

Peak Flood Depth and Level - PMF Event - Existing Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

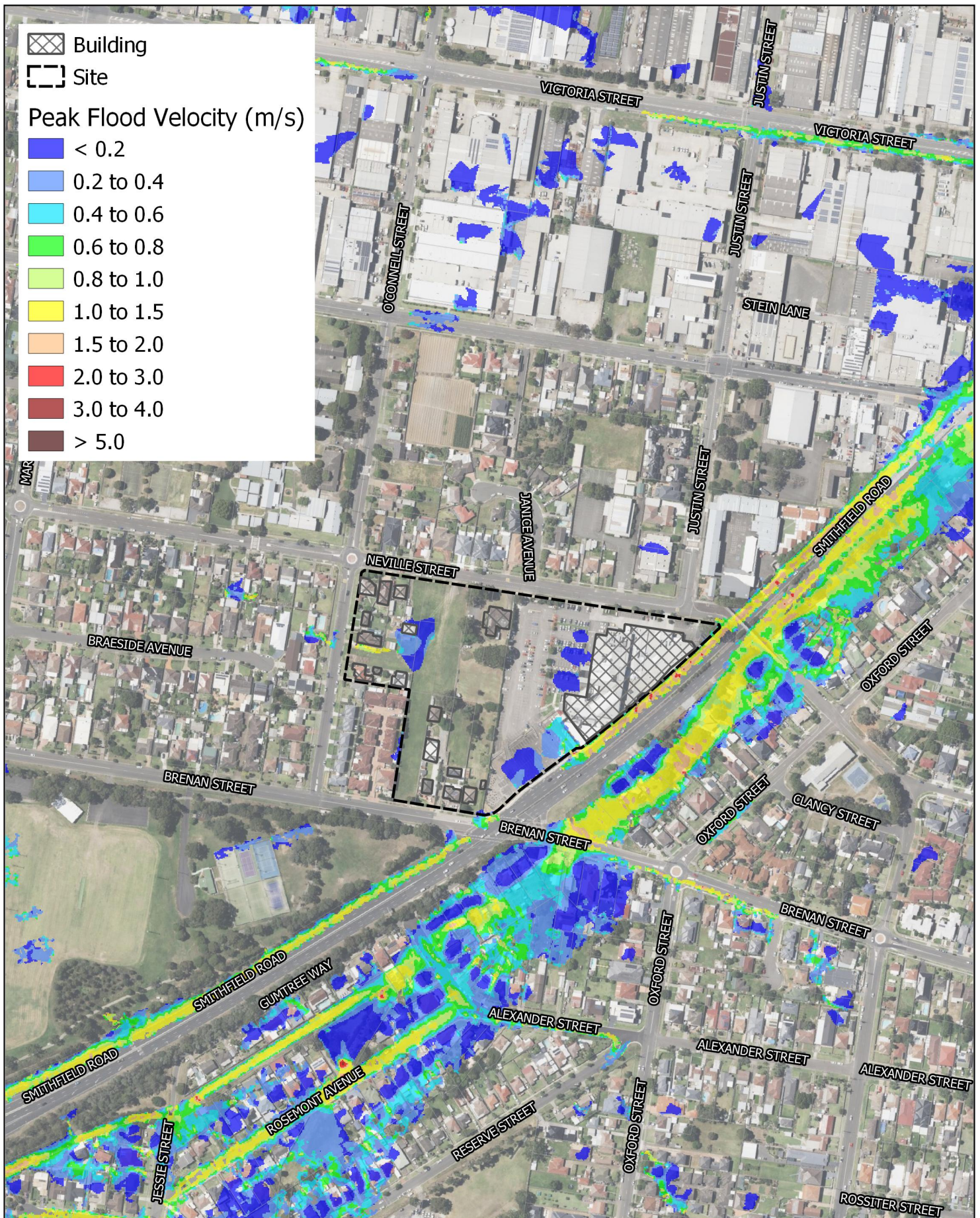
A-03

Rev:

-



www.bmt.org



Title:

Peak Flood Velocity - 1% AEP Event - Existing Conditions

Drawing:

A-04

Rev:

-

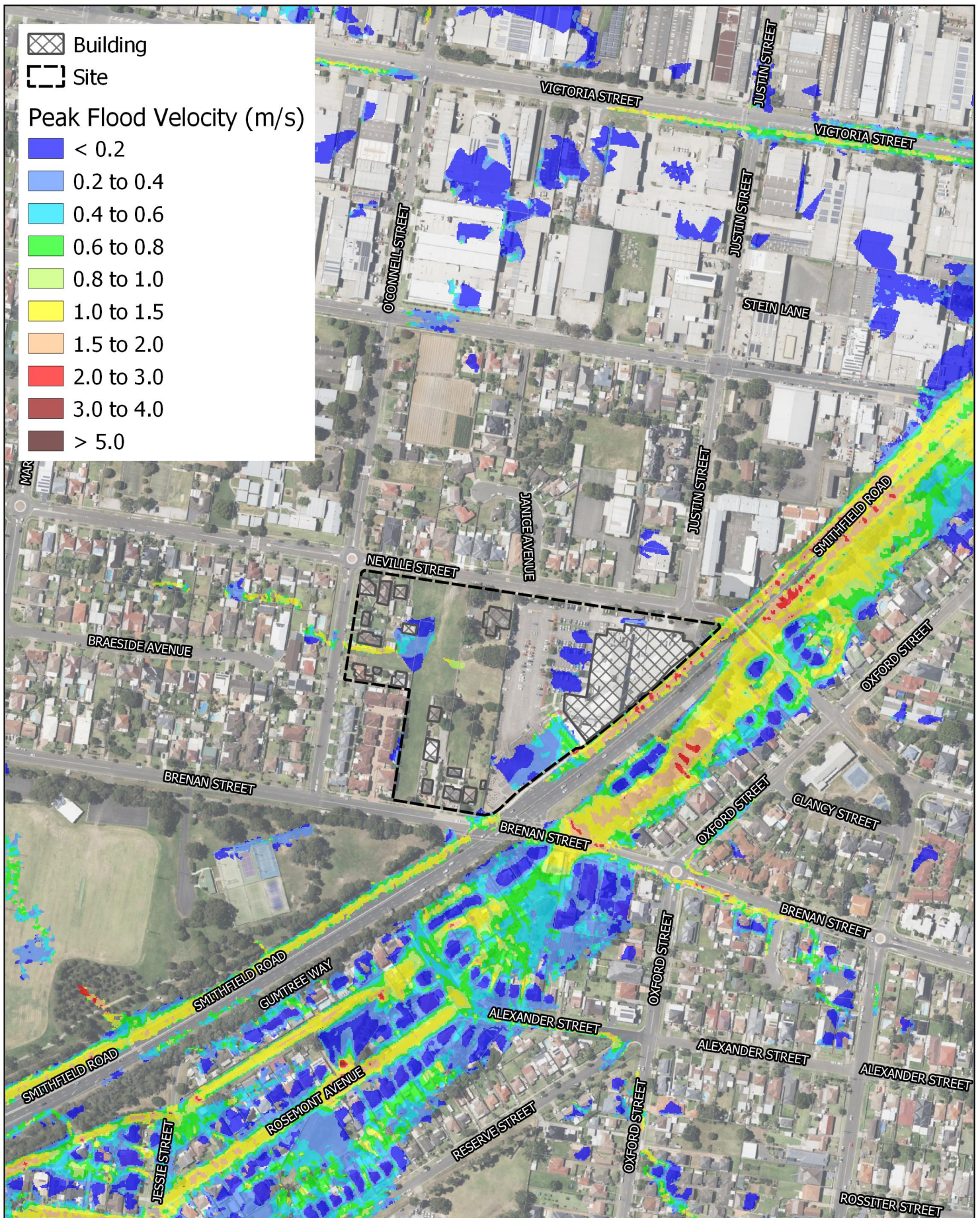
BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



www.bmt.org



Title:

Peak Flood Velocity - 1% AEP Event with Climate Change - Existing Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

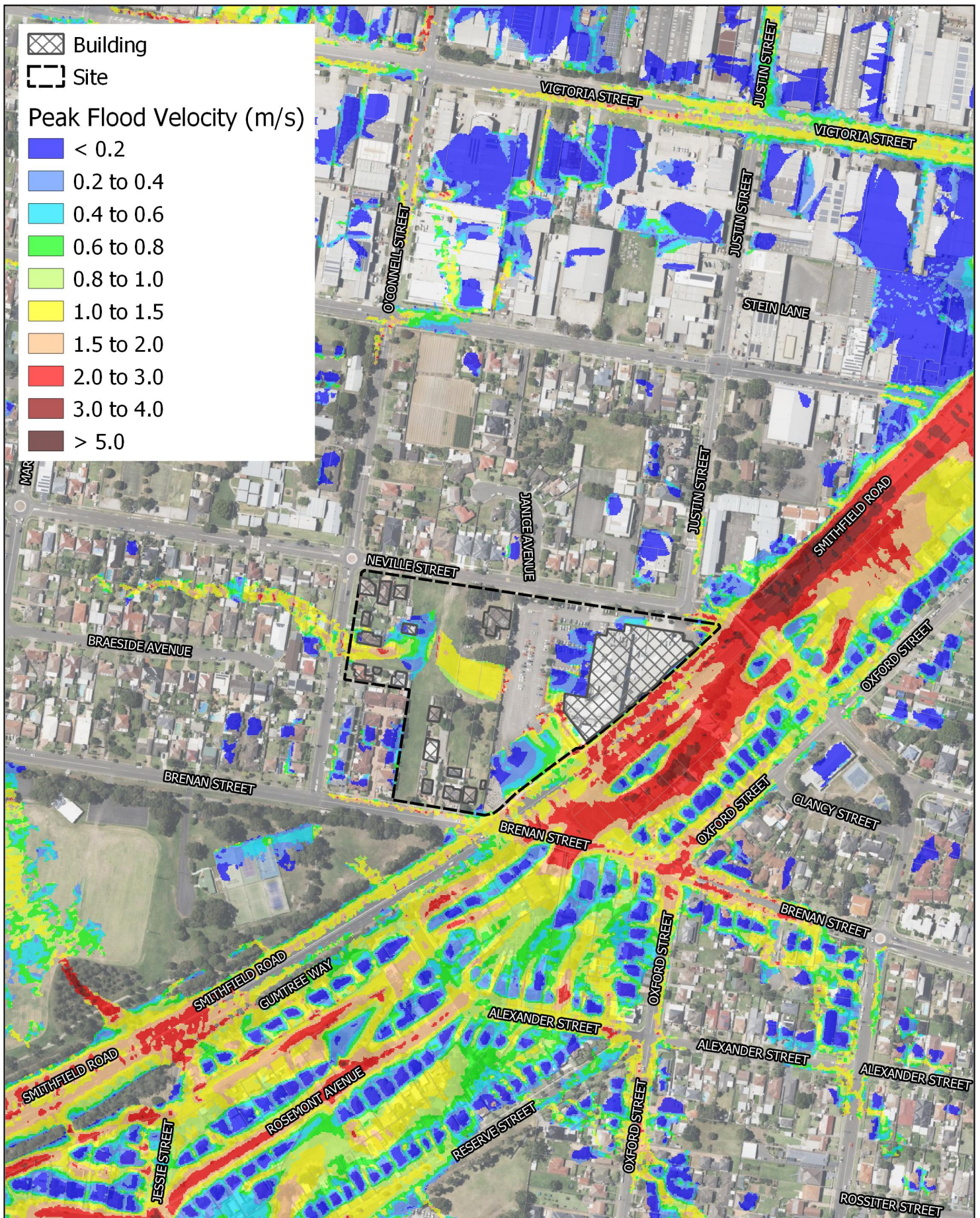
A-05

Rev:

-



www.bmt.org



Title:

Peak Flood Velocity - PMF Event - Existing Conditions

Drawing:

A-06

Rev:

-

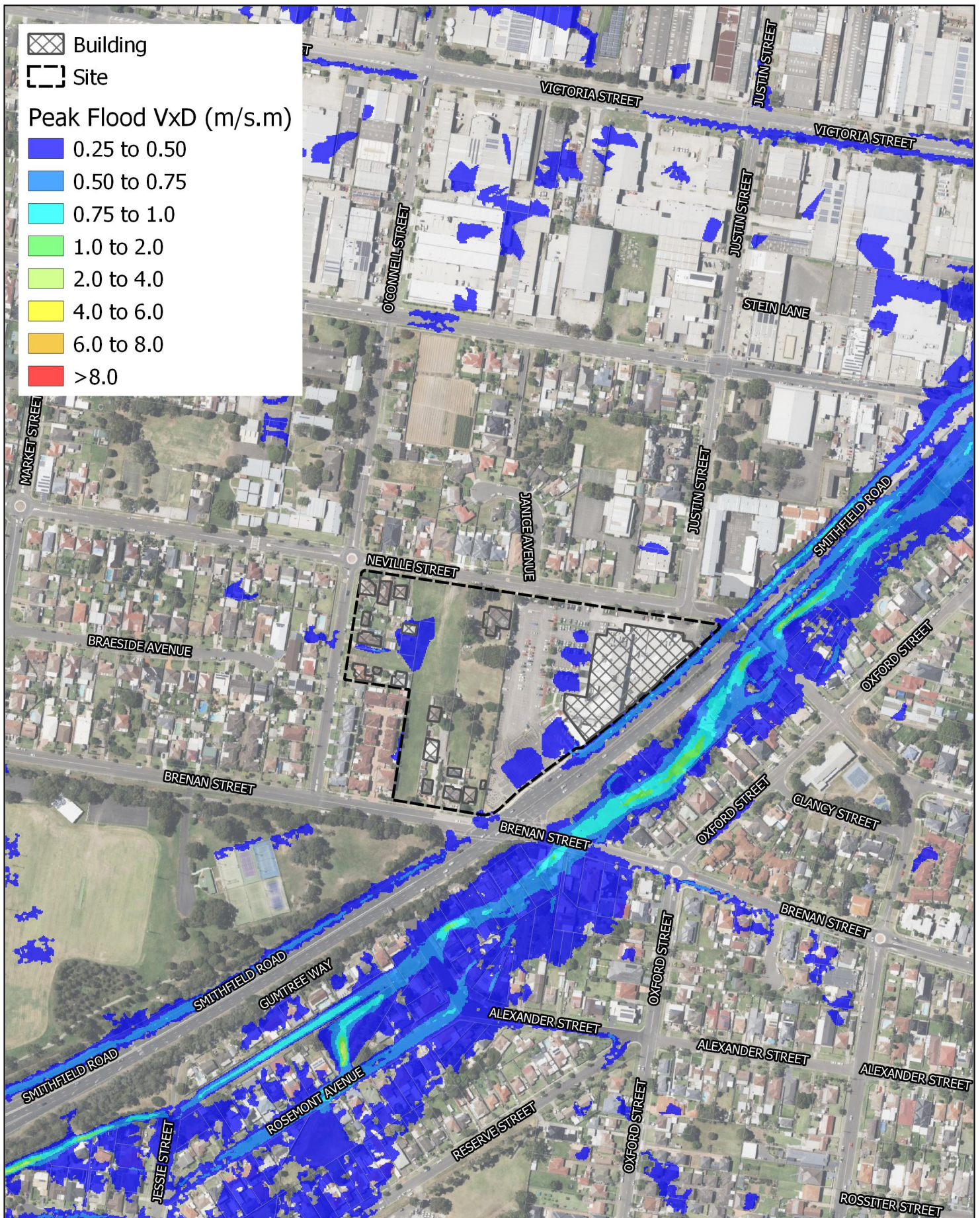
BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



www.bmt.org



Title:

Peak Flood VxD - 1% AEP Event - Existing Conditions

Drawing:

A-07

Rev:

-

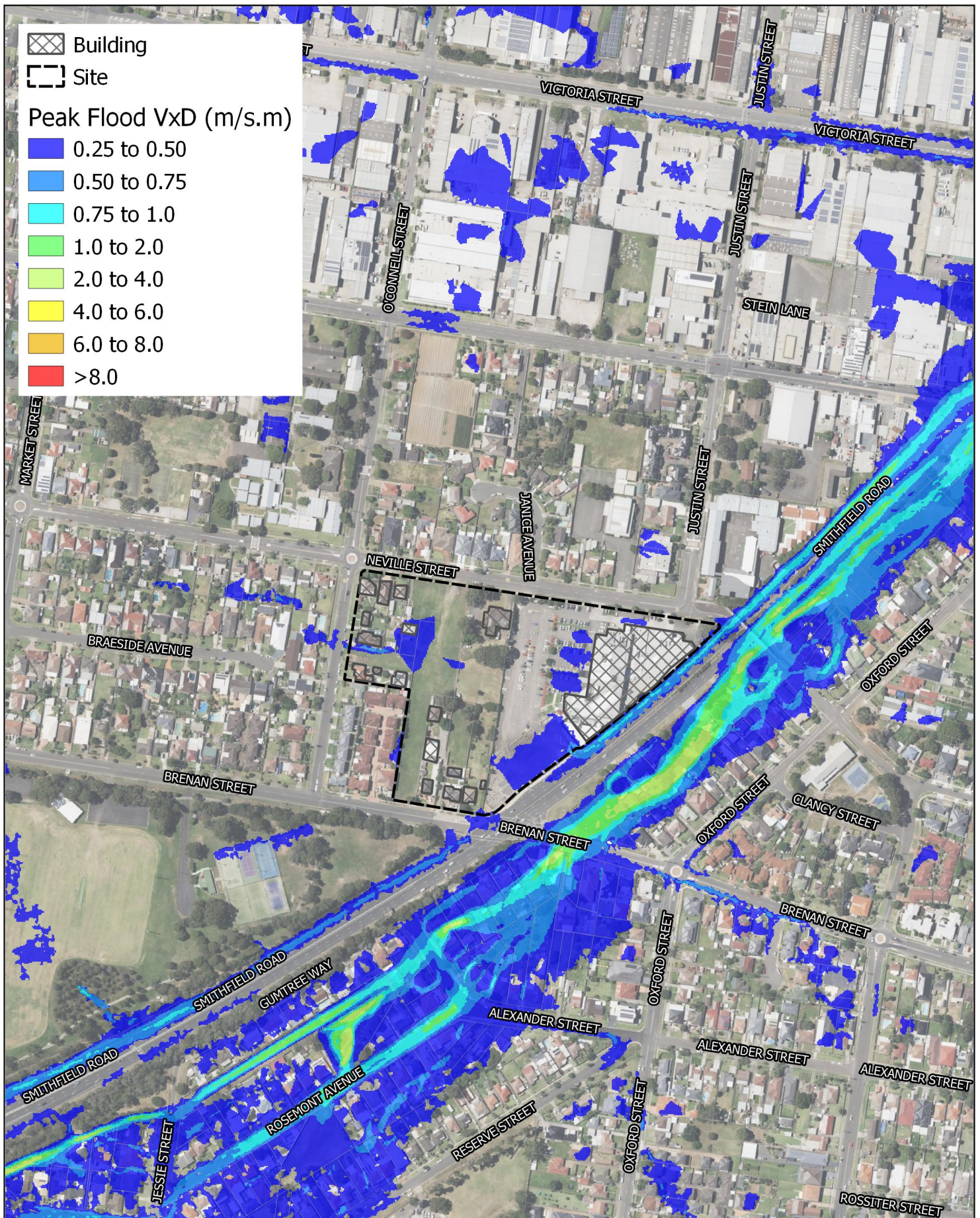
BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



www.bmt.org



Title:

Peak Flood VxD - 1% AEP Event with Climate Change - Existing Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

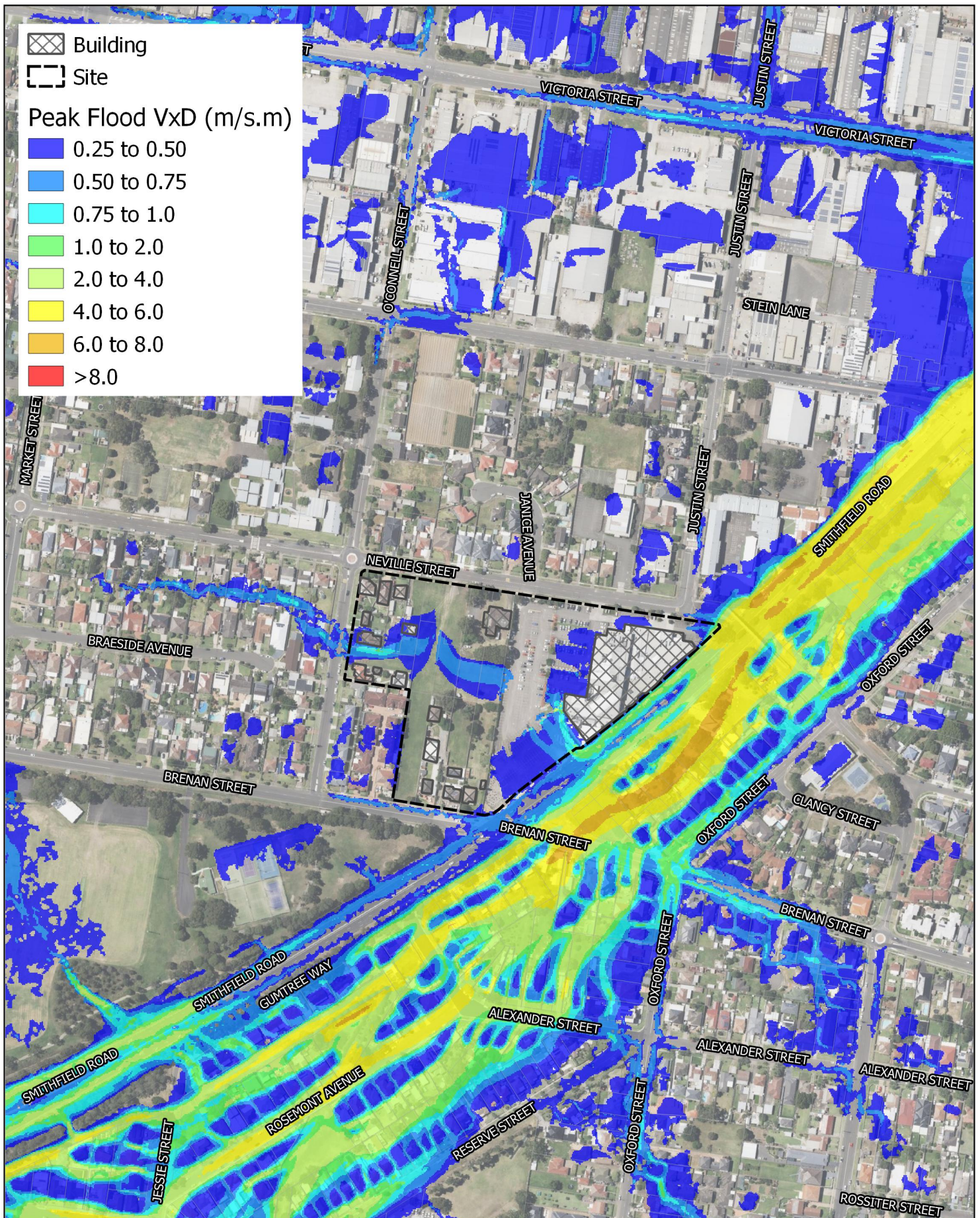
A-08

Rev:

-



www.bmt.org



Title:

Peak Flood VxD - PMF Event - Existing Conditions

Drawing:

A-09

Rev:

-

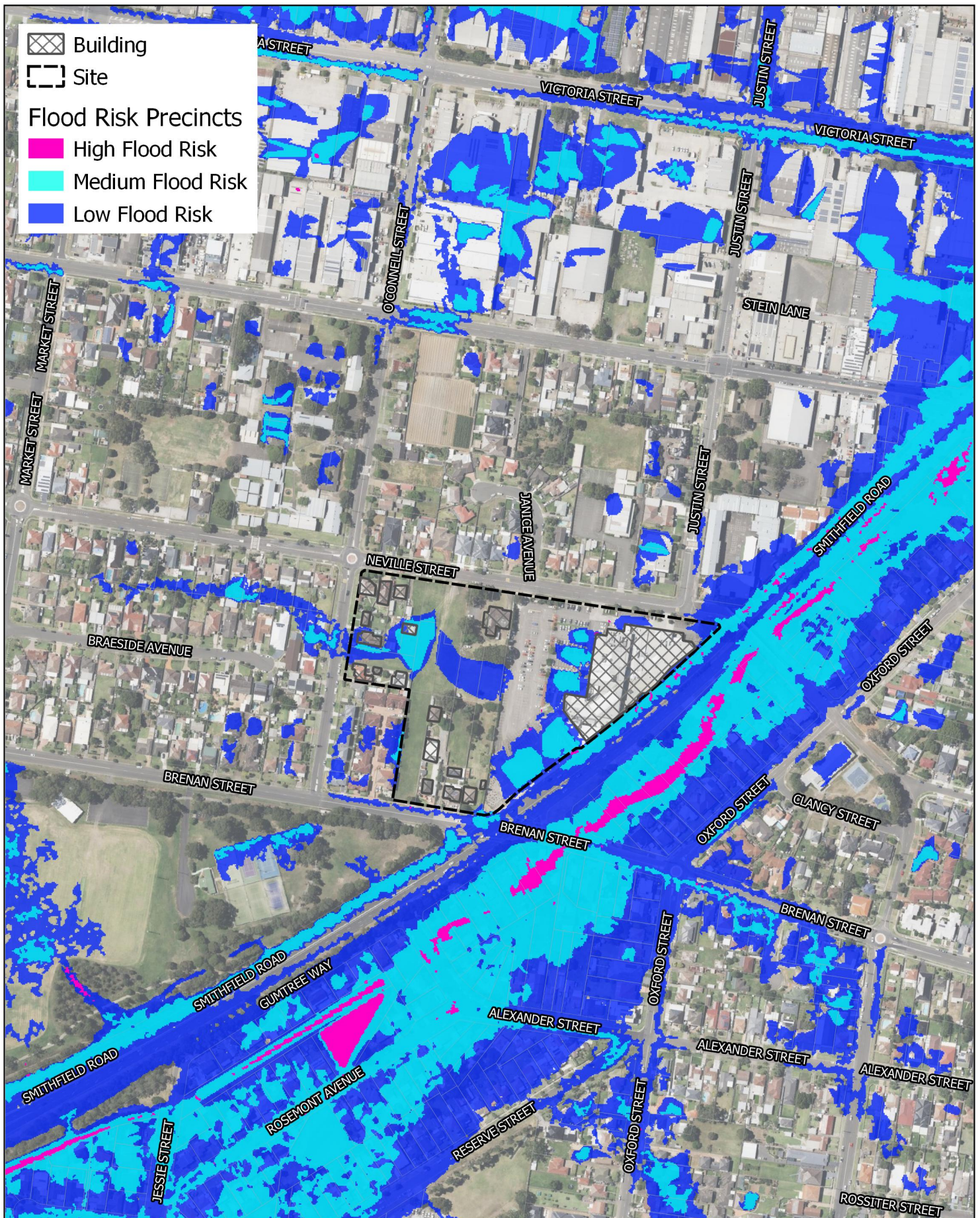
BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



www.bmt.org



Title:

Flood Risk Precinct - Existing Conditions

Drawing:

A-10

Rev:

-

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

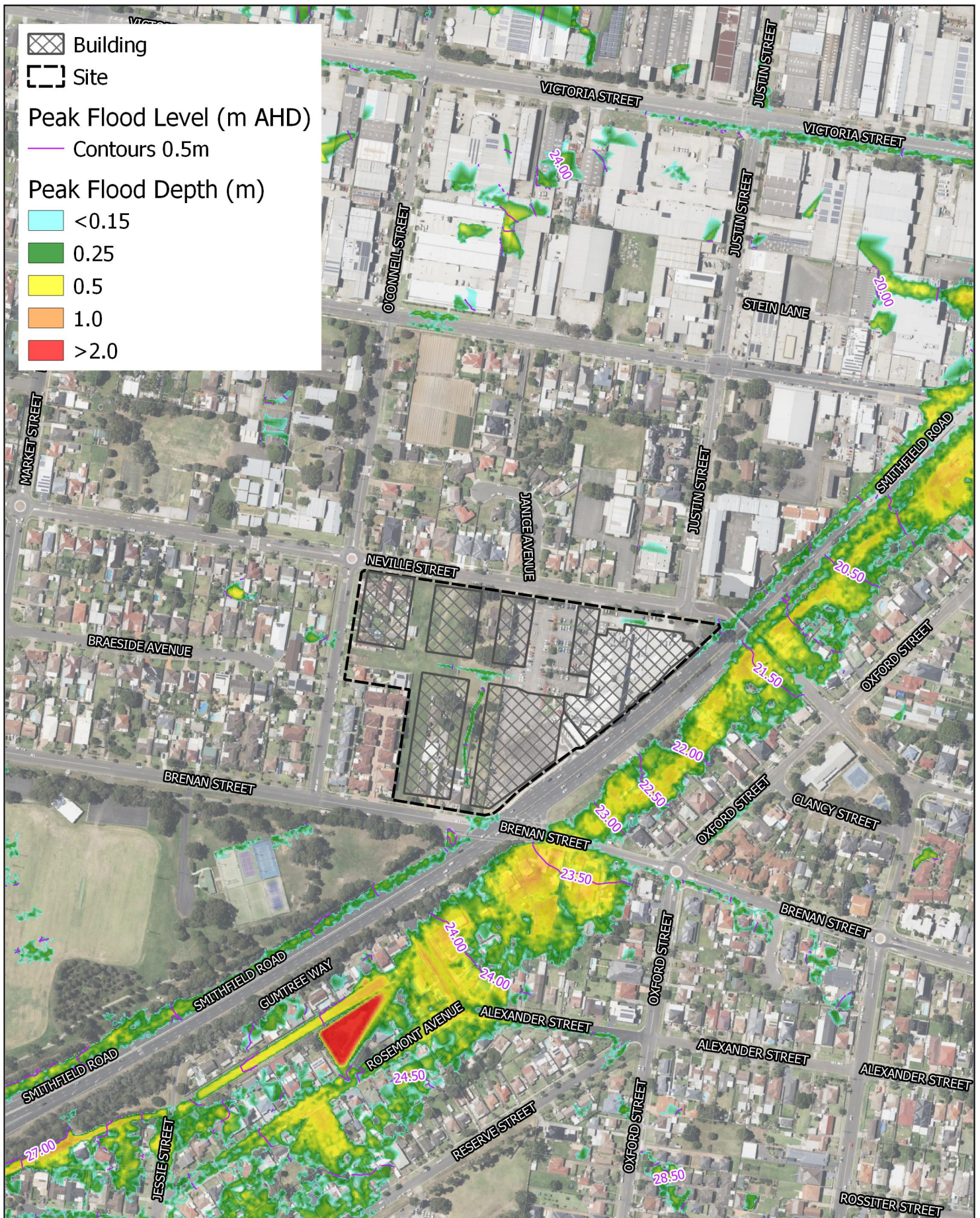


0 50 100 150 200 m



www.bmt.org

Annex B Post-development Flood Conditions



Title:

Peak Flood Depth and Level - 1% AEP Event - Post-development Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

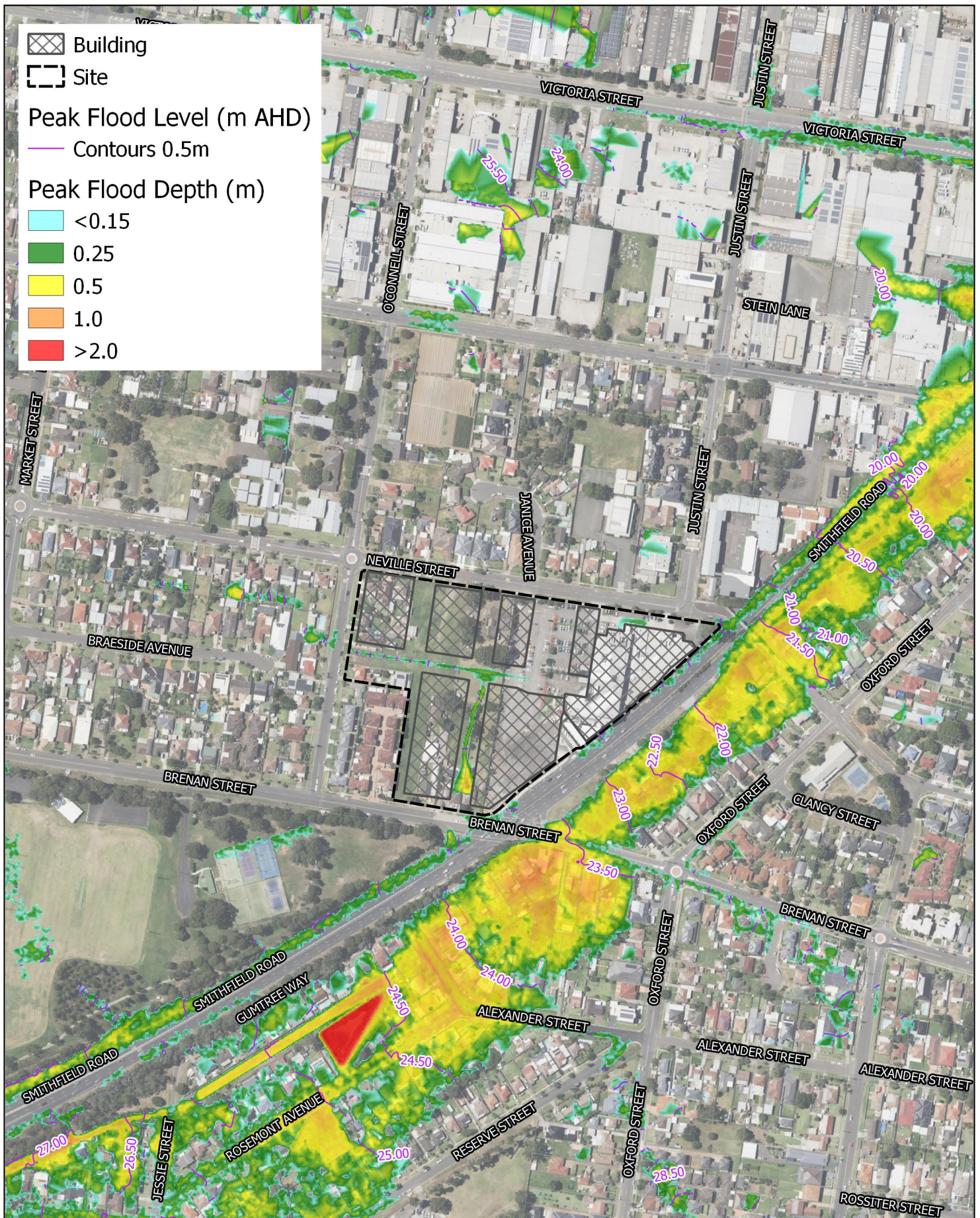
B-01

Rev:

-



www.bmt.org



Title:

Peak Flood Depth and Level - 1% AEP Event with Climate Change - Post-development Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

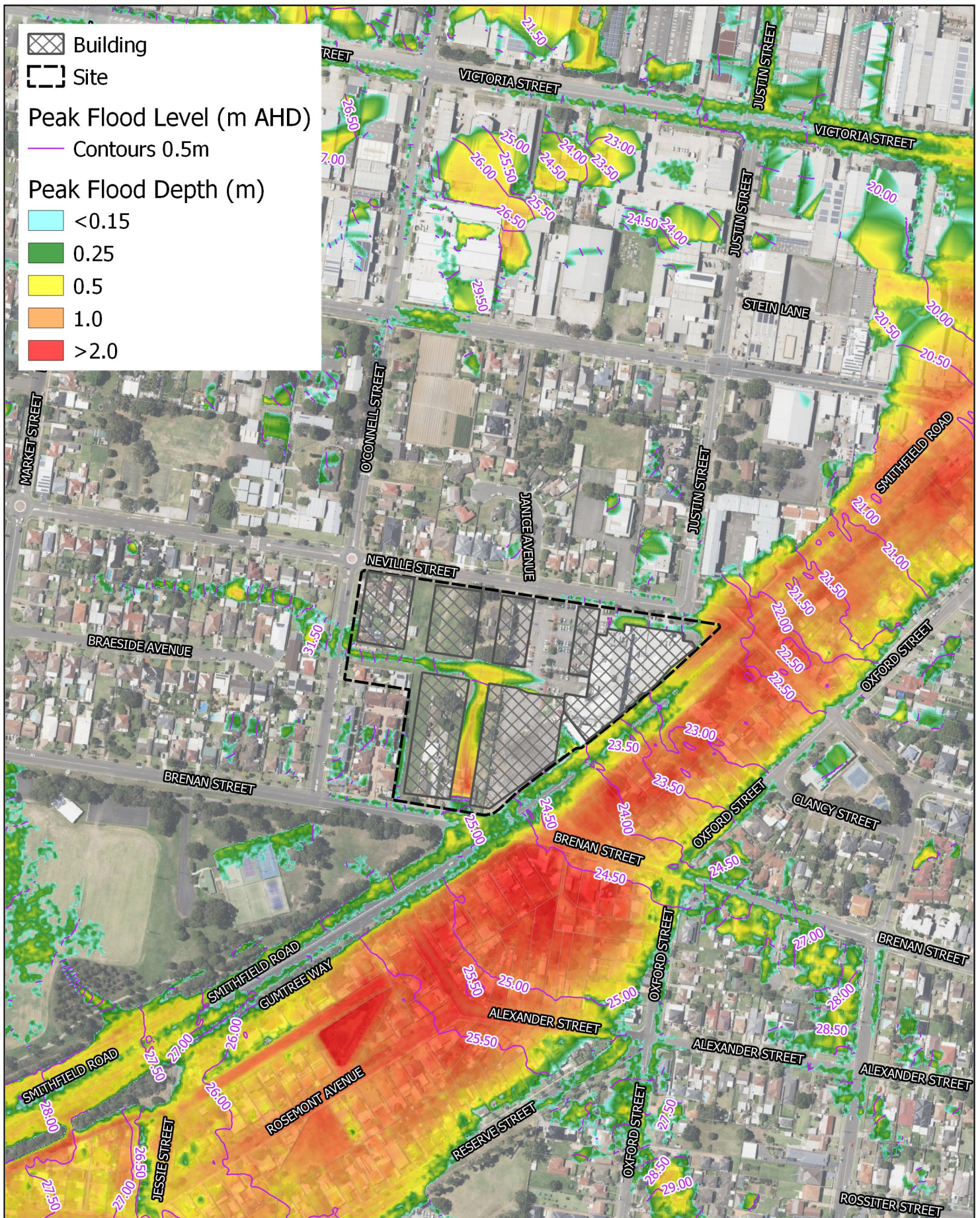
B-02

Rev:

-



www.bmt.org



Title:

Peak Flood Depth and Level - PMF Event - Post-development Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

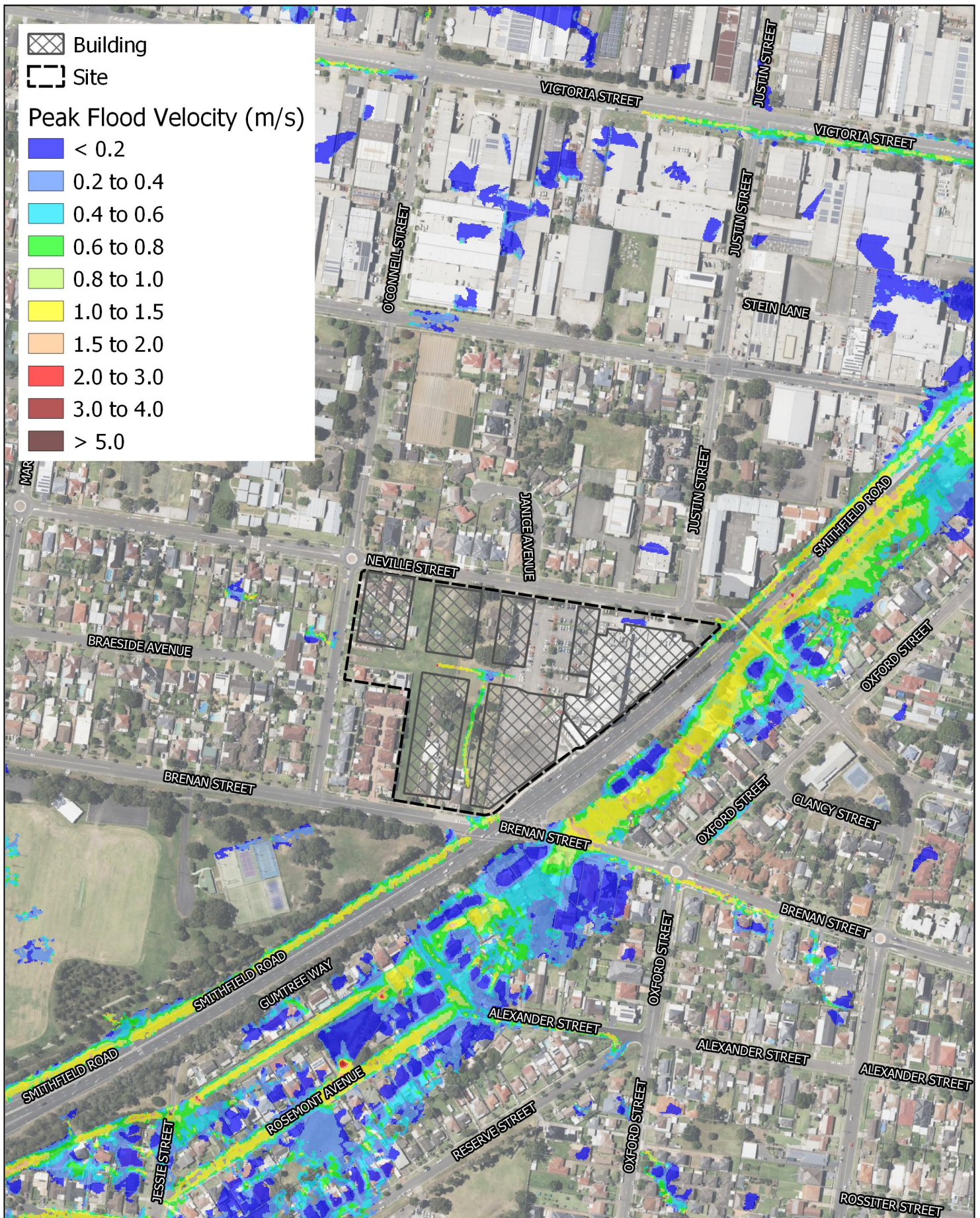
B-03

Rev:

-



www.bmt.org



Title:

Peak Flood Velocity - 1% AEP Event - Post-development Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

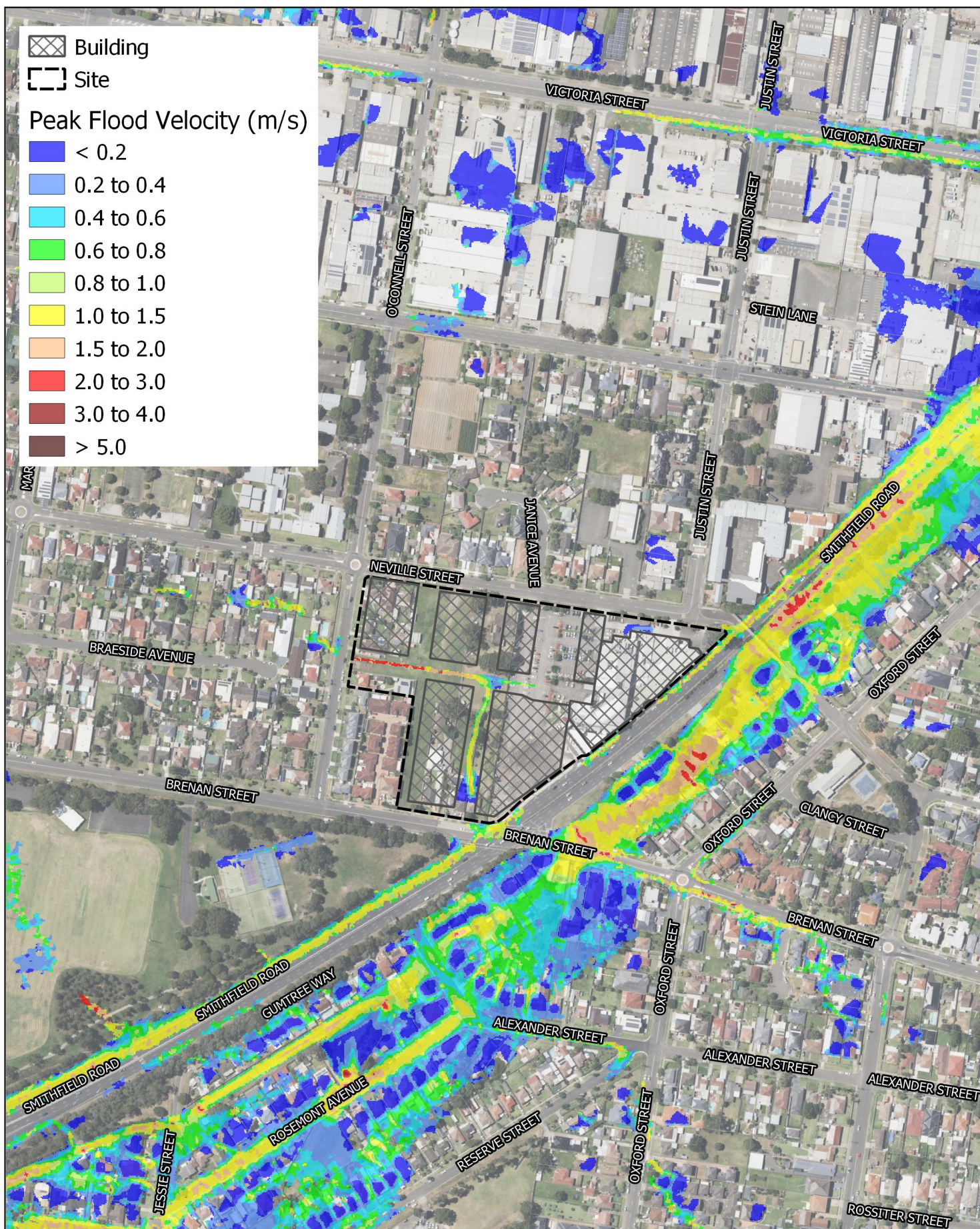
B-04

Rev:

-



www.bmt.org



Title:

Peak Flood Velocity - 1% AEP Event with Climate Change - Post-development Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

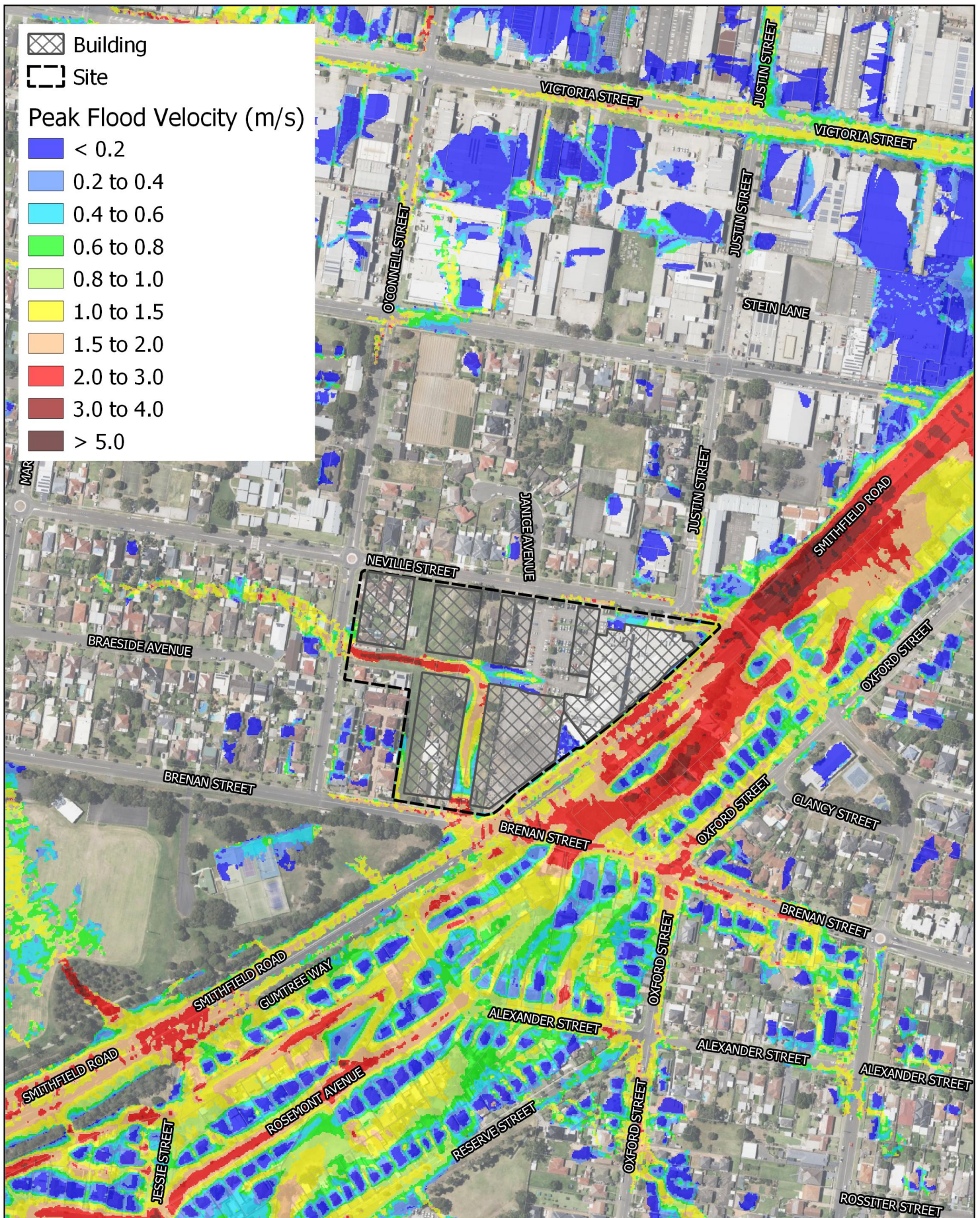
B-05

Rev:

-



www.bmt.org



Title:

Peak Flood Velocity - PMF Event - Post-development Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

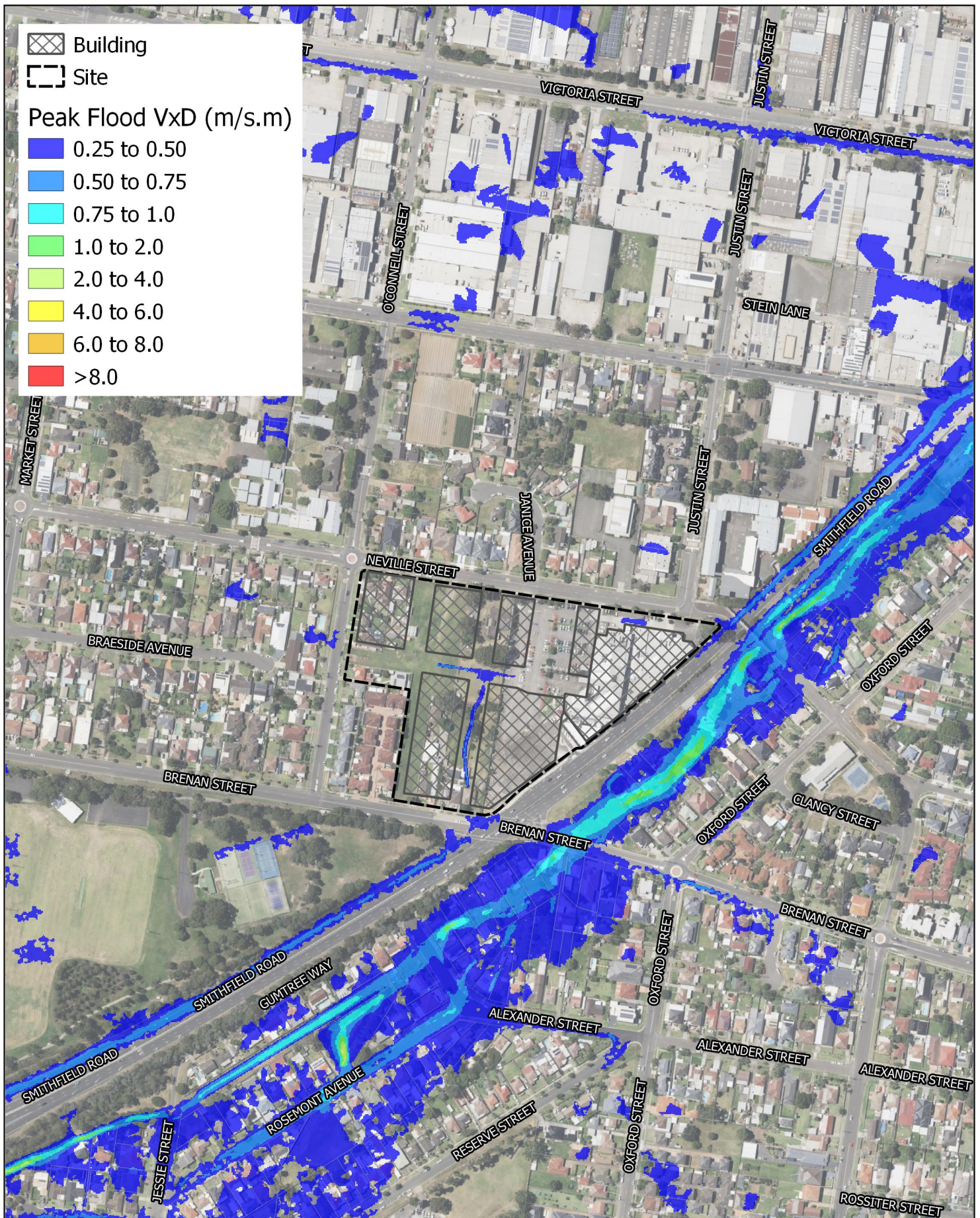
B-06

Rev:

-



www.bmt.org



Title:

Peak Flood VxD - 1% AEP Event - Post-development Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

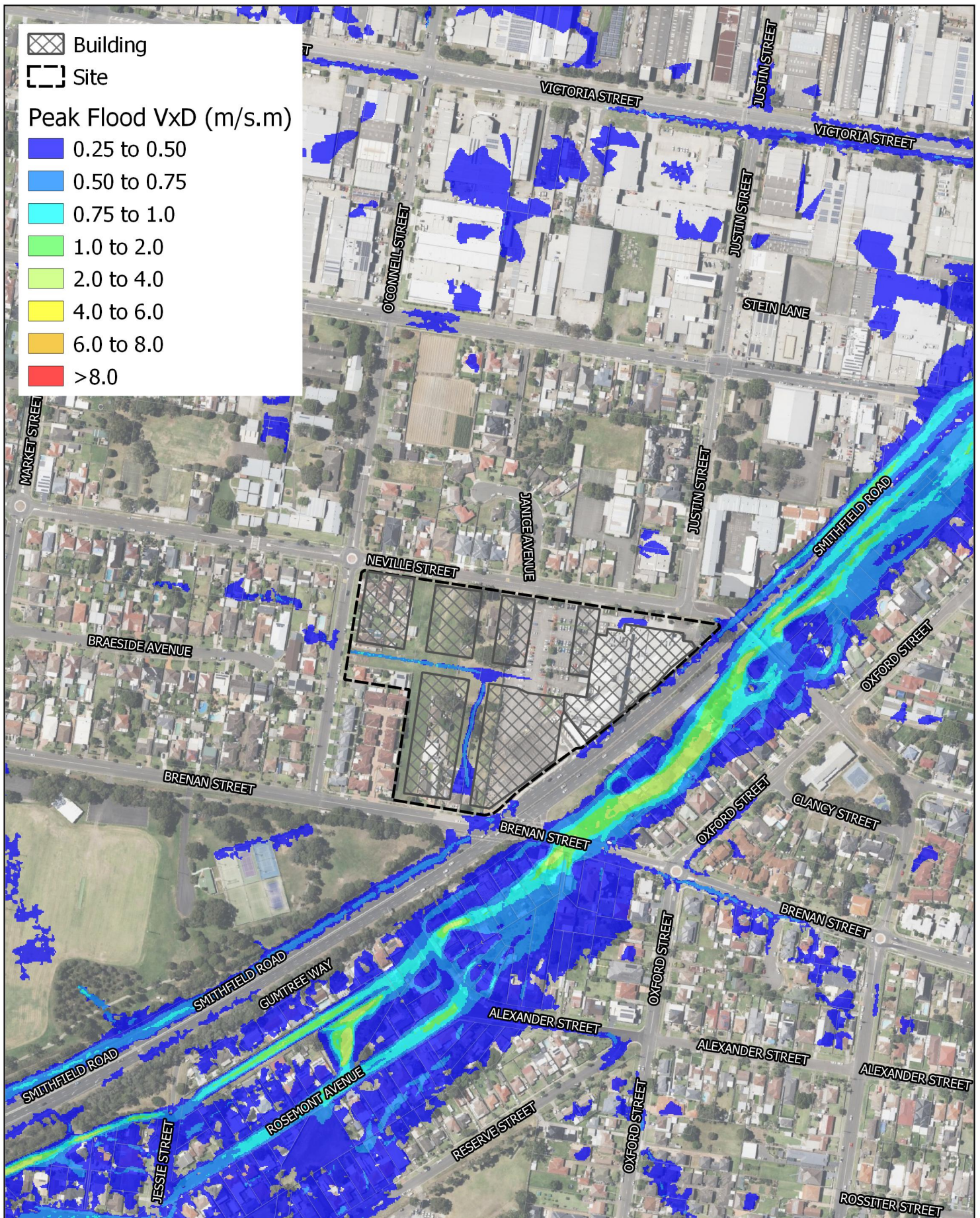
B-07

Rev:

-



www.bmt.org



Title:

Peak Flood VxD - 1% AEP Event with Climate Change - Post-development Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

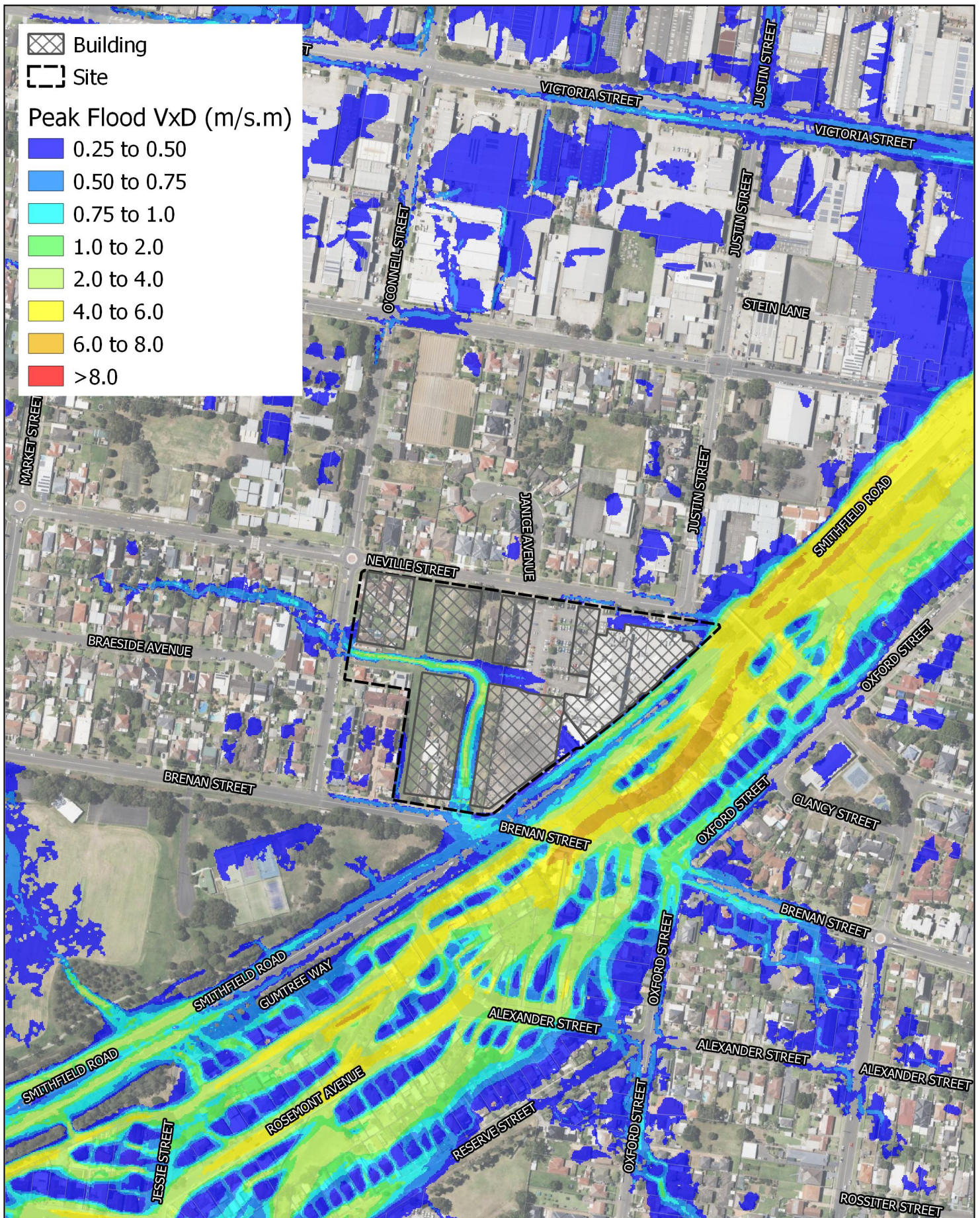
B-08

Rev:

-



www.bmt.org



Title:

Peak Flood VxD - PMF Event - Post-development Conditions

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

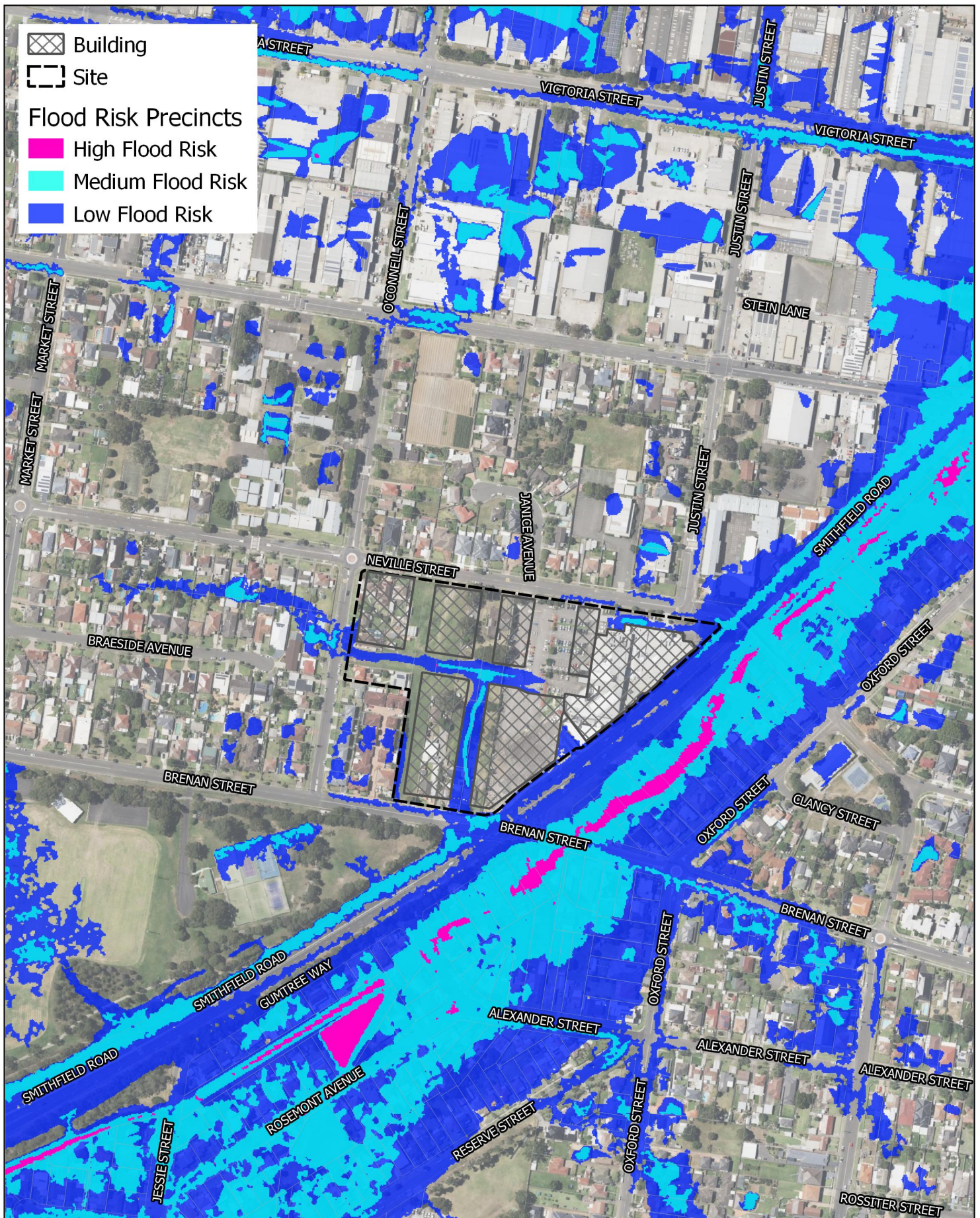
B-09

Rev:

-



www.bmt.org



Title:

Flood Risk Precinct - Post-development Conditions

Drawing:

B-10

Rev:

-

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.

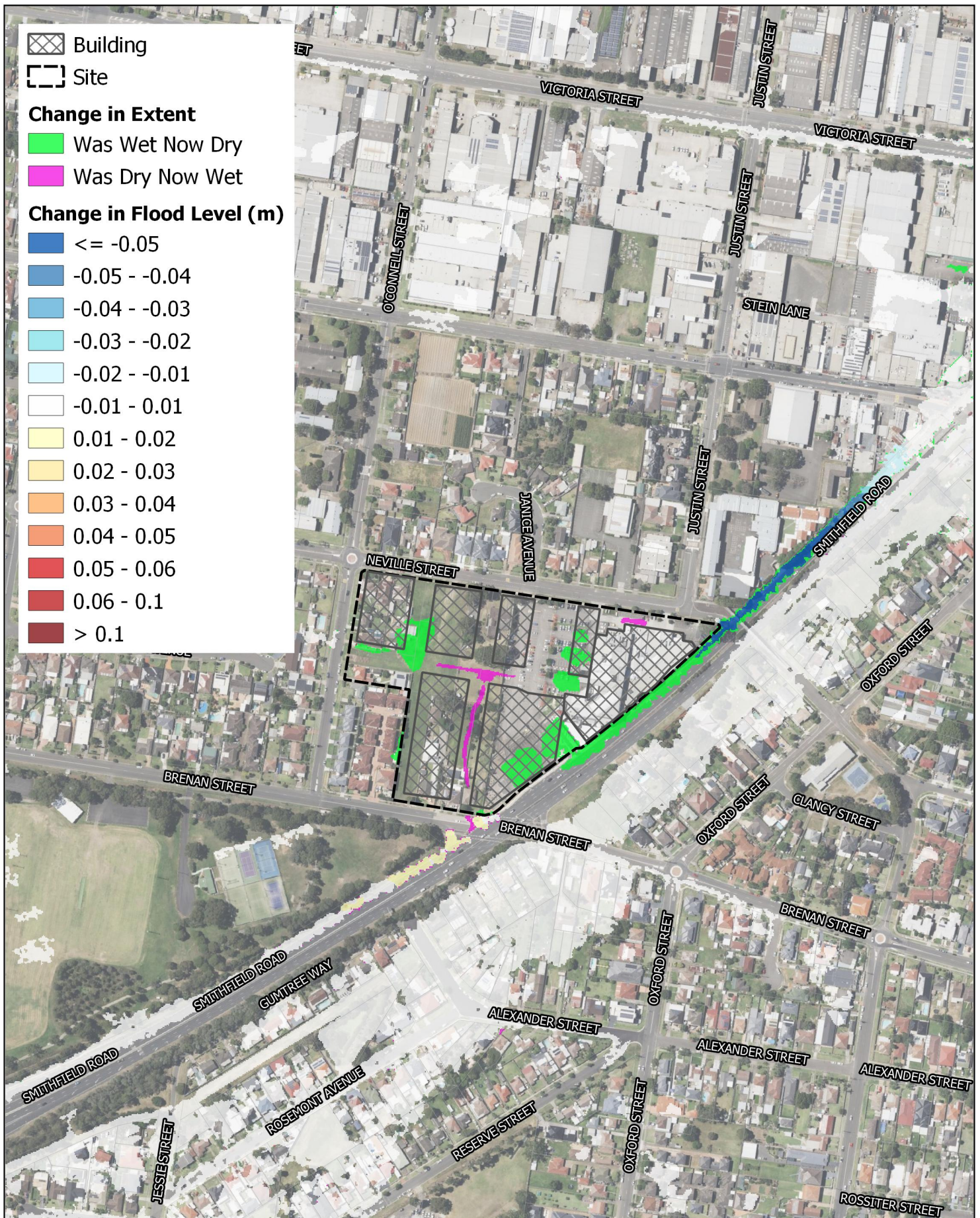


0 50 100 150 200 m



www.bmt.org

Annex C Peak Flood Impacts



Title:
Peak Flood Level Impact - 1% AEP Event

Drawing:
C-01

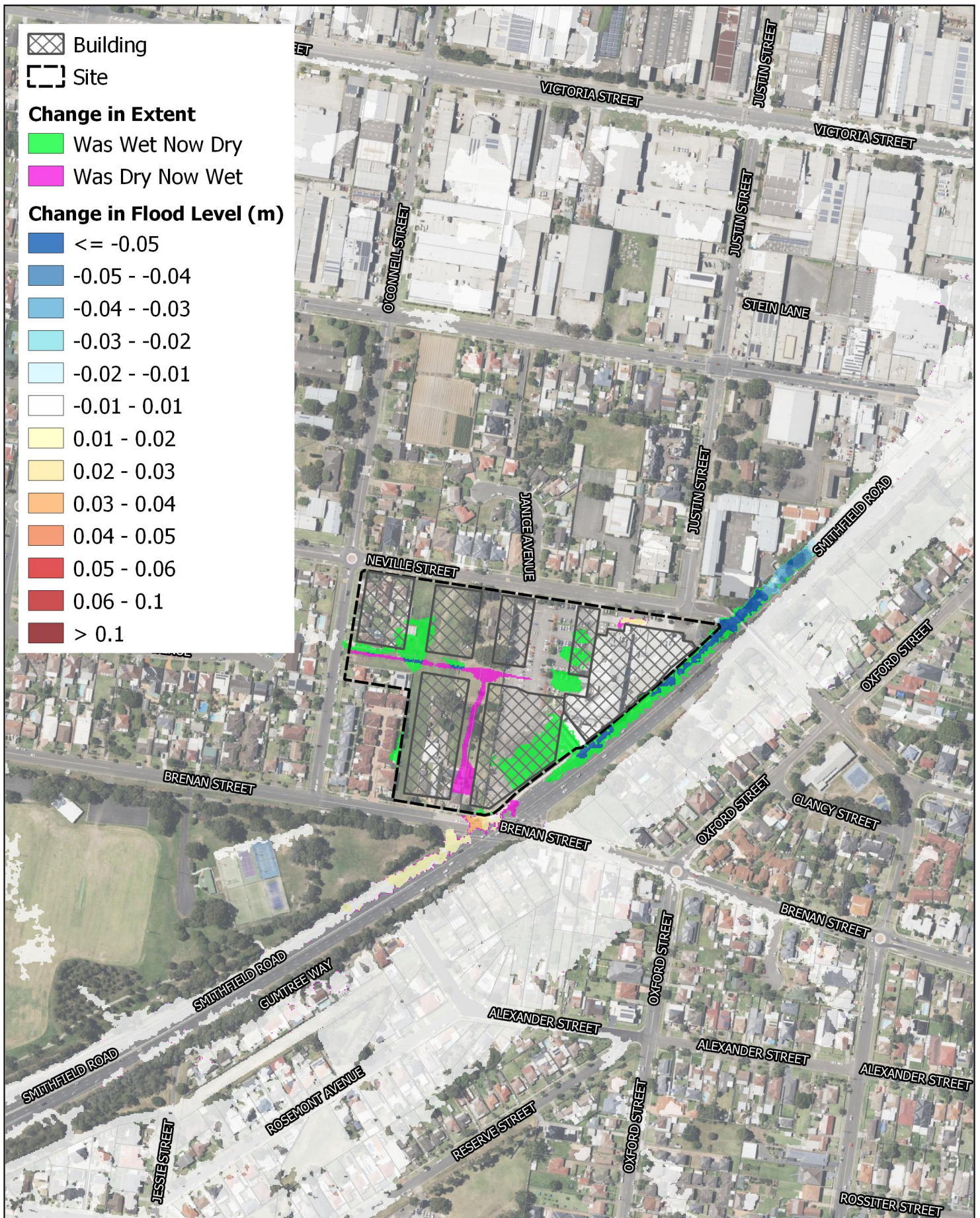
Rev:
-

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m





Title:

Peak Flood Level Impact - 1% AEP Event with Climate Change

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

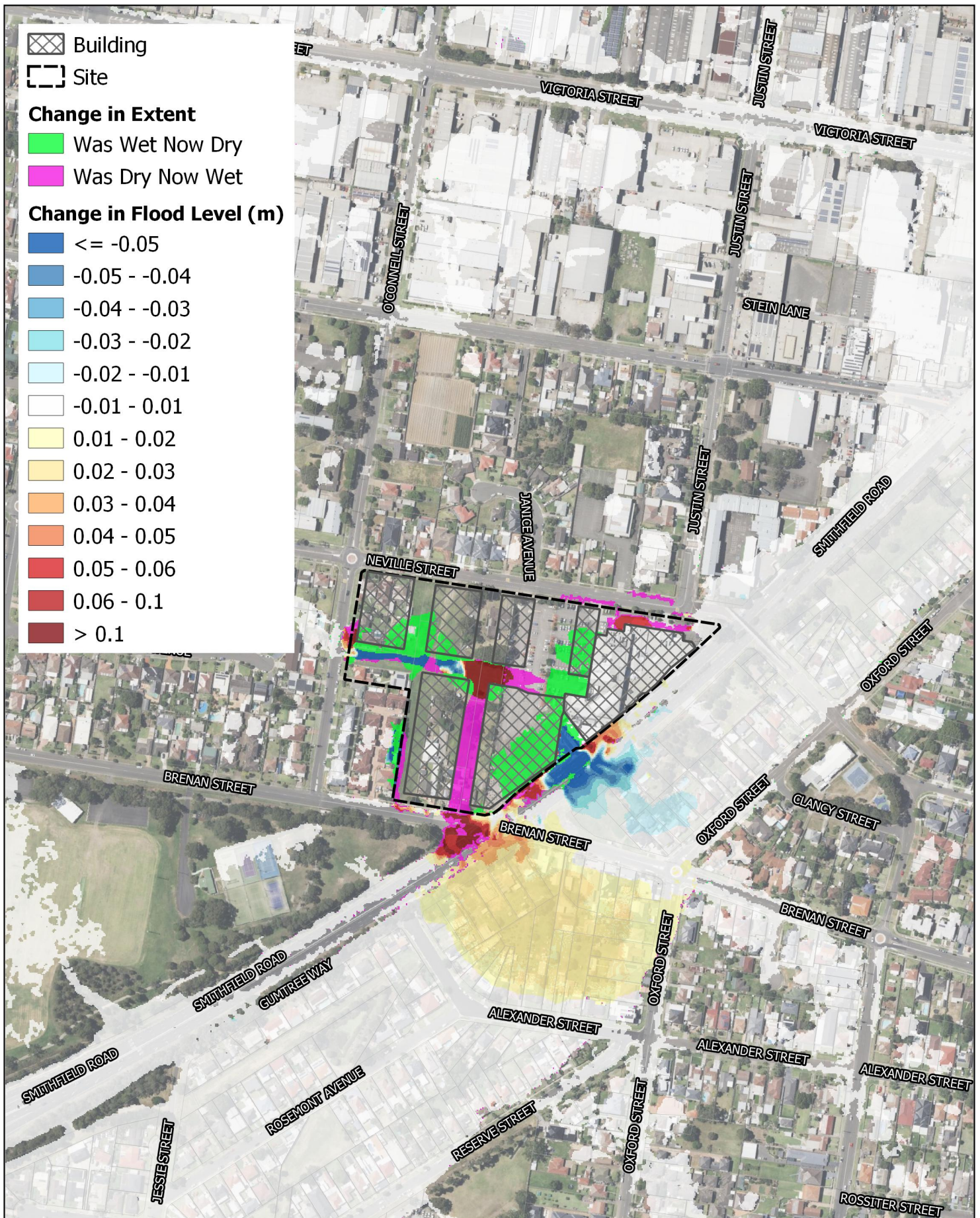
C-02

Rev:

-



www.bmt.org



Title:

Peak Flood Level Impact - PMF Event

Drawing:

C-03

Rev:

-

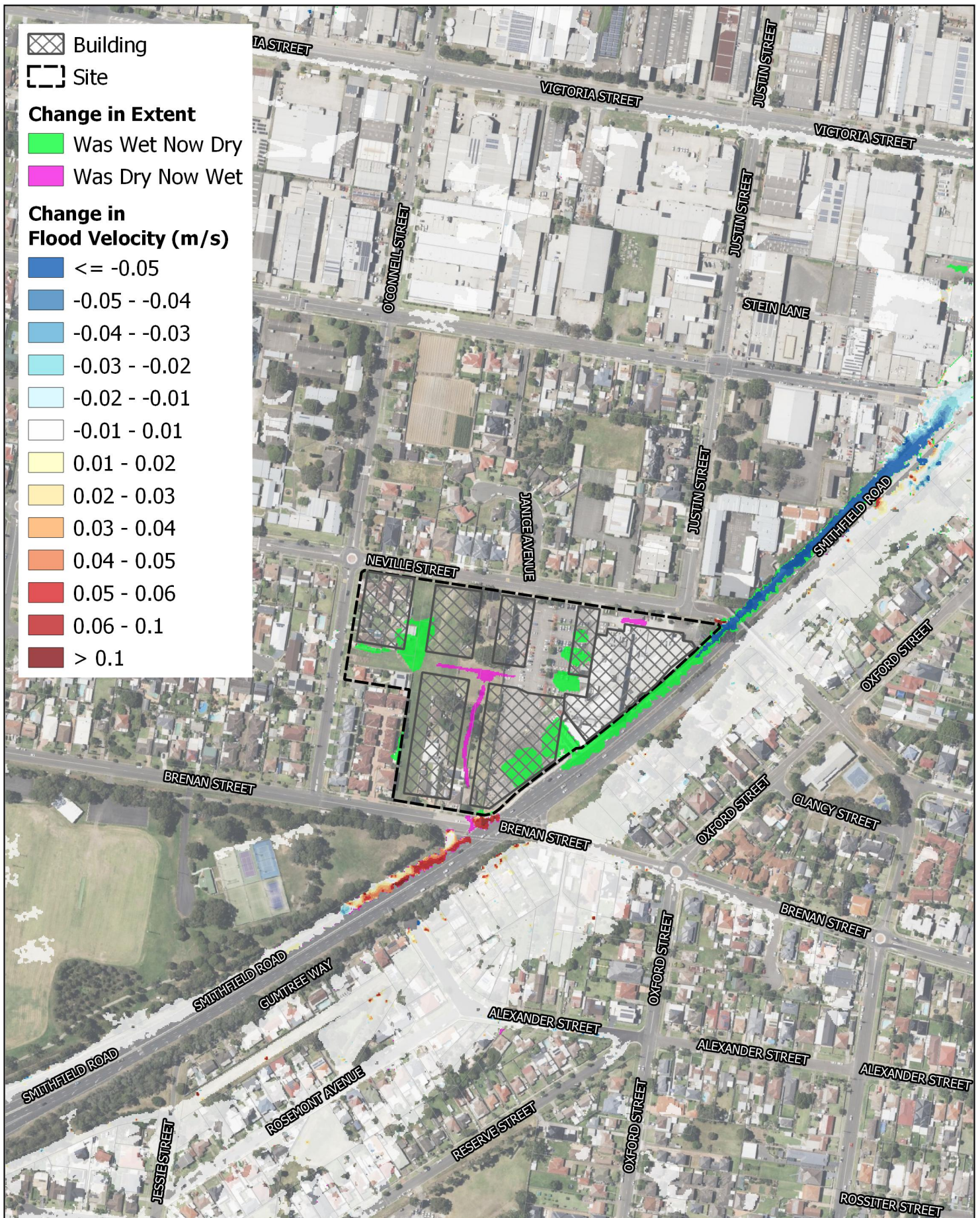
BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



www.bmt.org



Title:

Peak Flood Velocity Impact - 1% AEP Event

Drawing:

C-04

Rev:

-

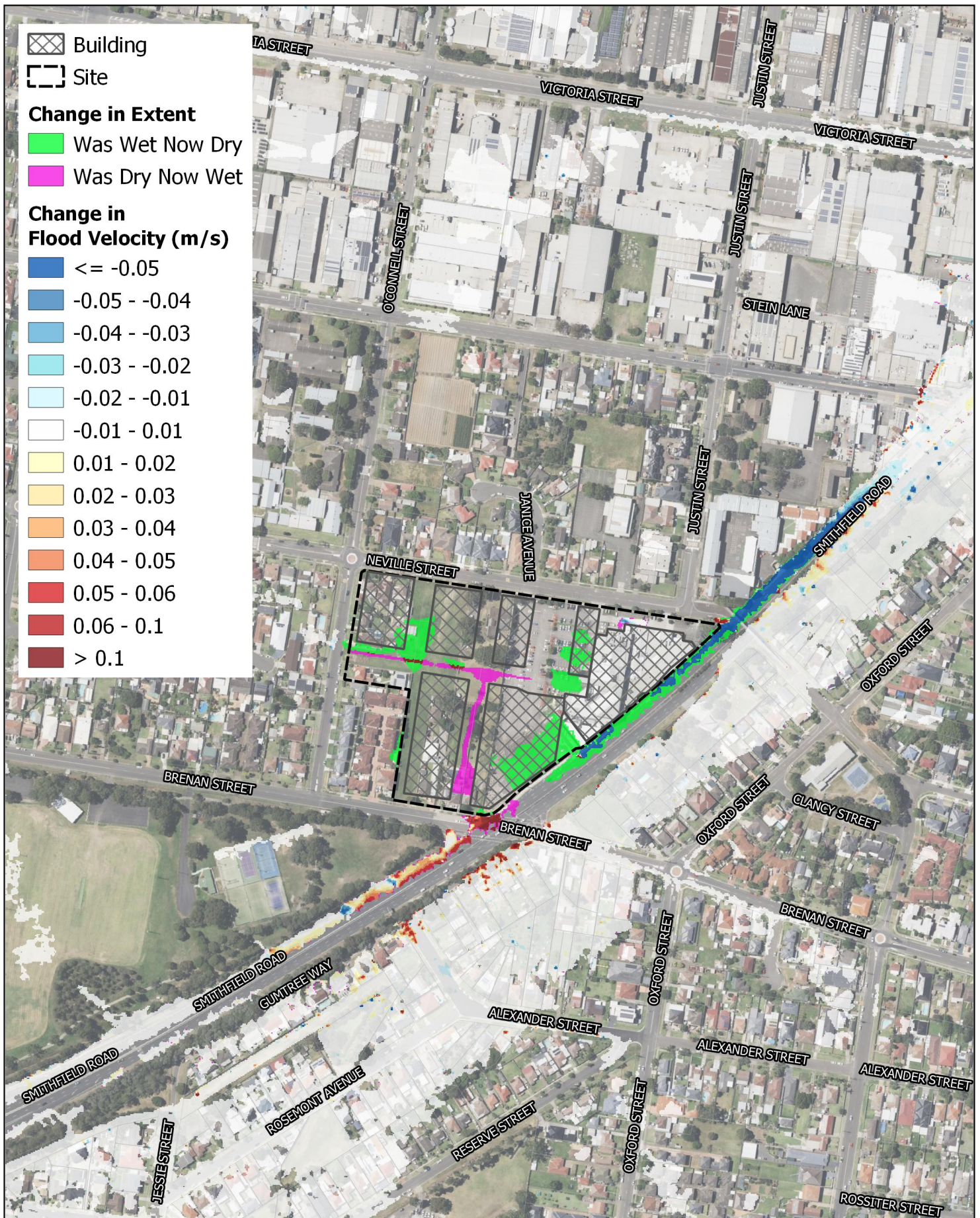
BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



www.bmt.org



Title:

Peak Flood Velocity Impact - 1% AEP Event with Climate Change

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

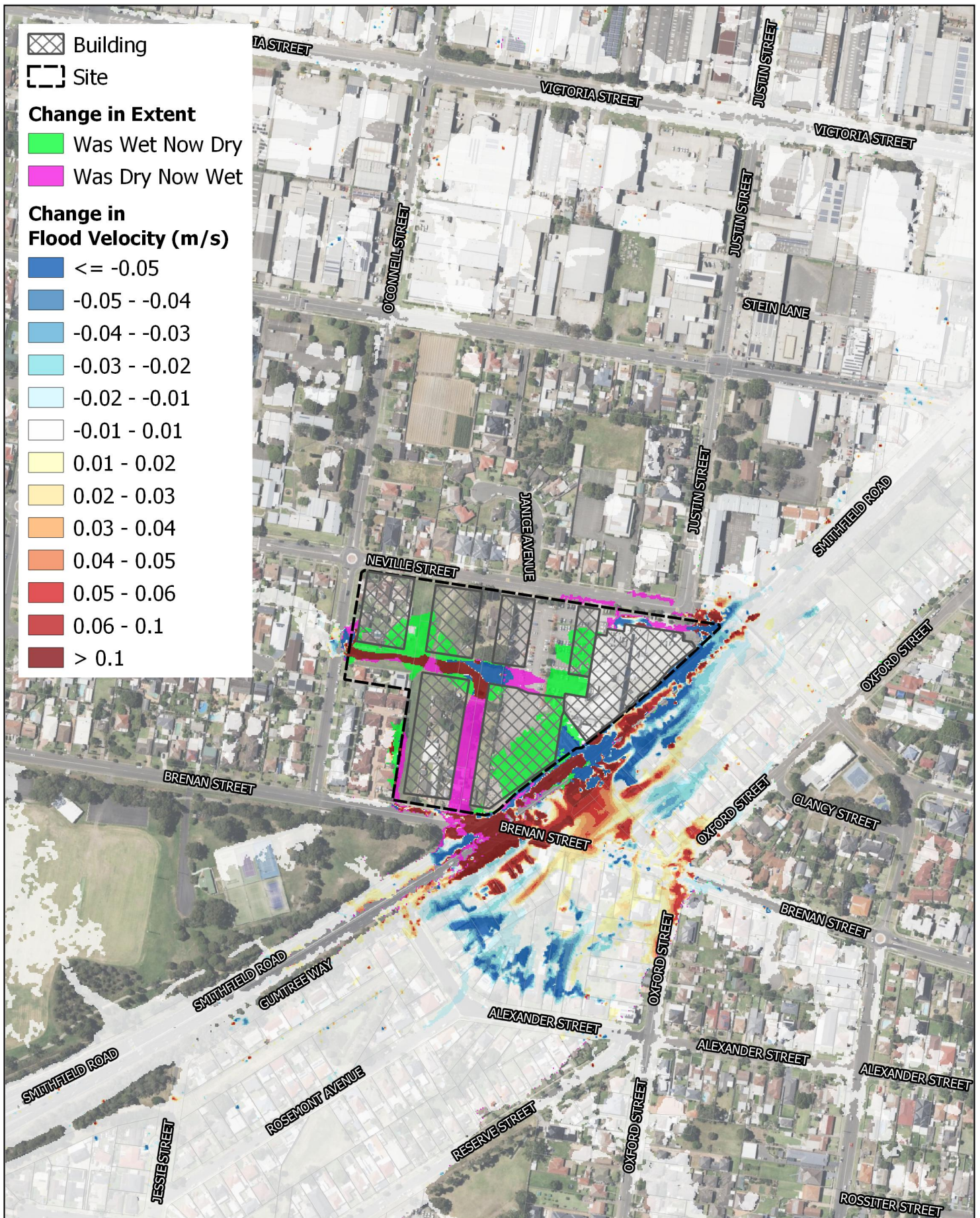
C-05

Rev:

-



www.bmt.org



Title:

Peak Flood Velocity Impact - PMF Event

Drawing:

C-06

Rev:

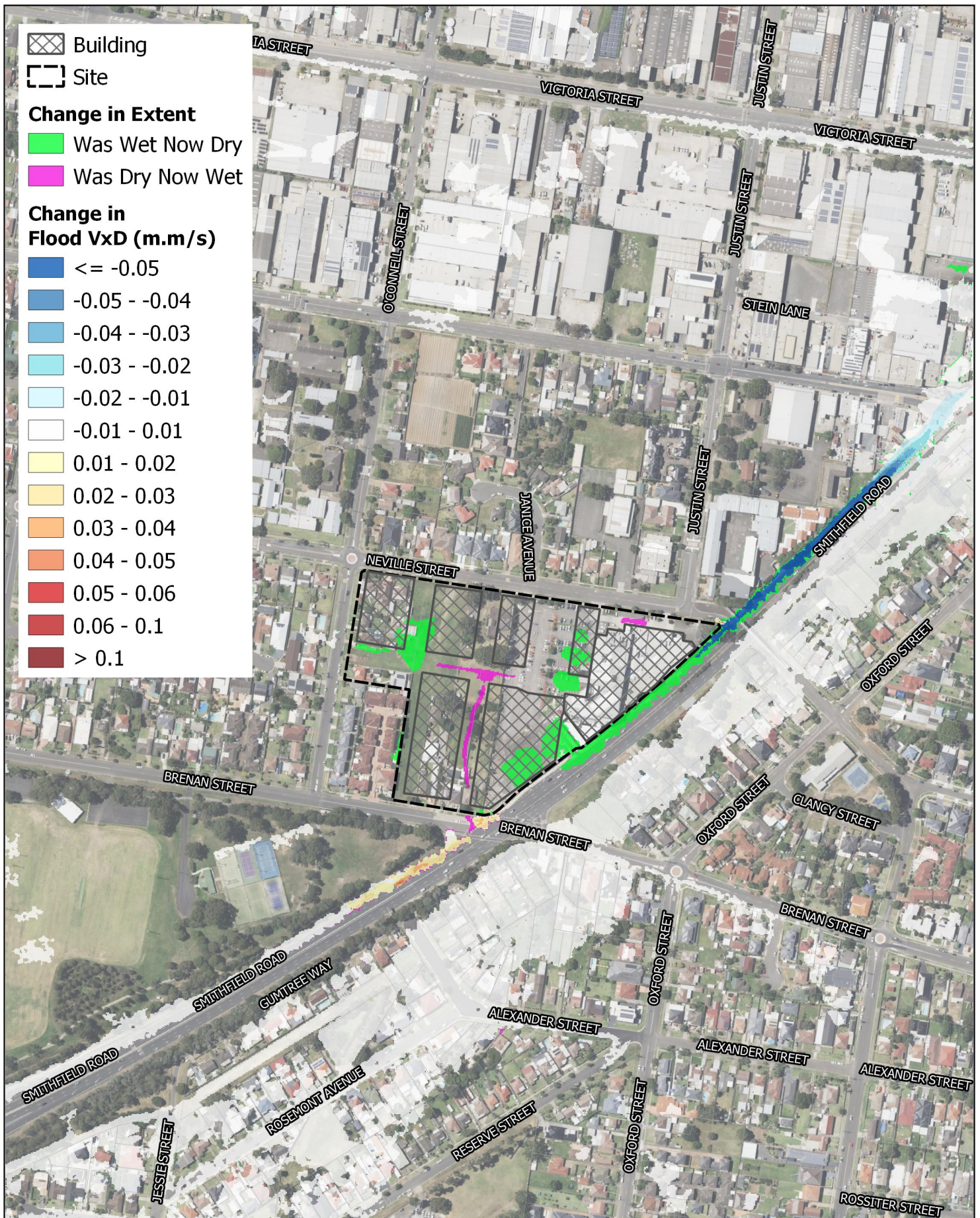
-

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m





Title:

Peak Flood VxD Impact - 1% AEP Event

Drawing:

C-07

Rev:

-

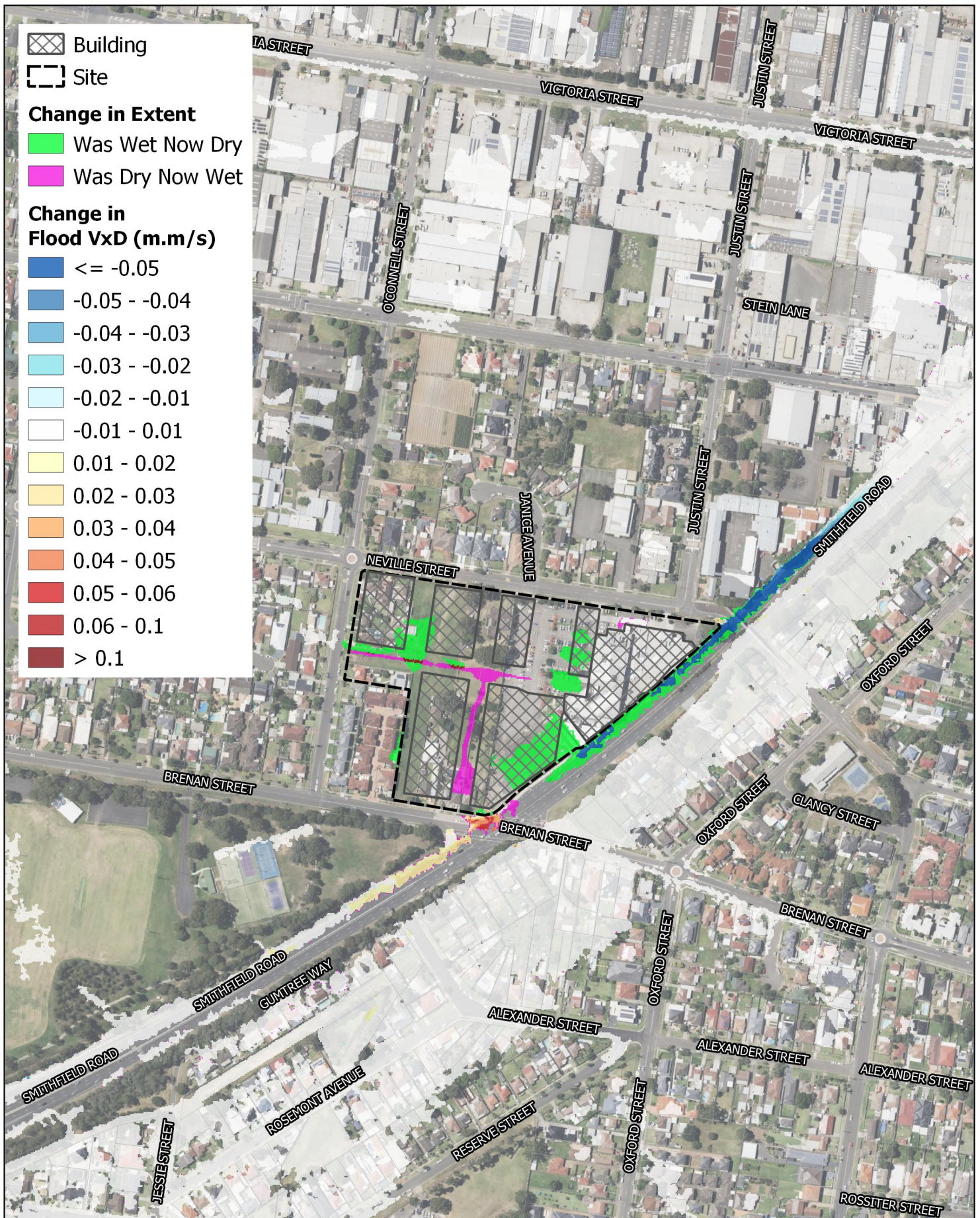
BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



www.bmt.org



Title:

Peak Flood VxD Impact - 1% AEP Event with Climate Change

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



Drawing:

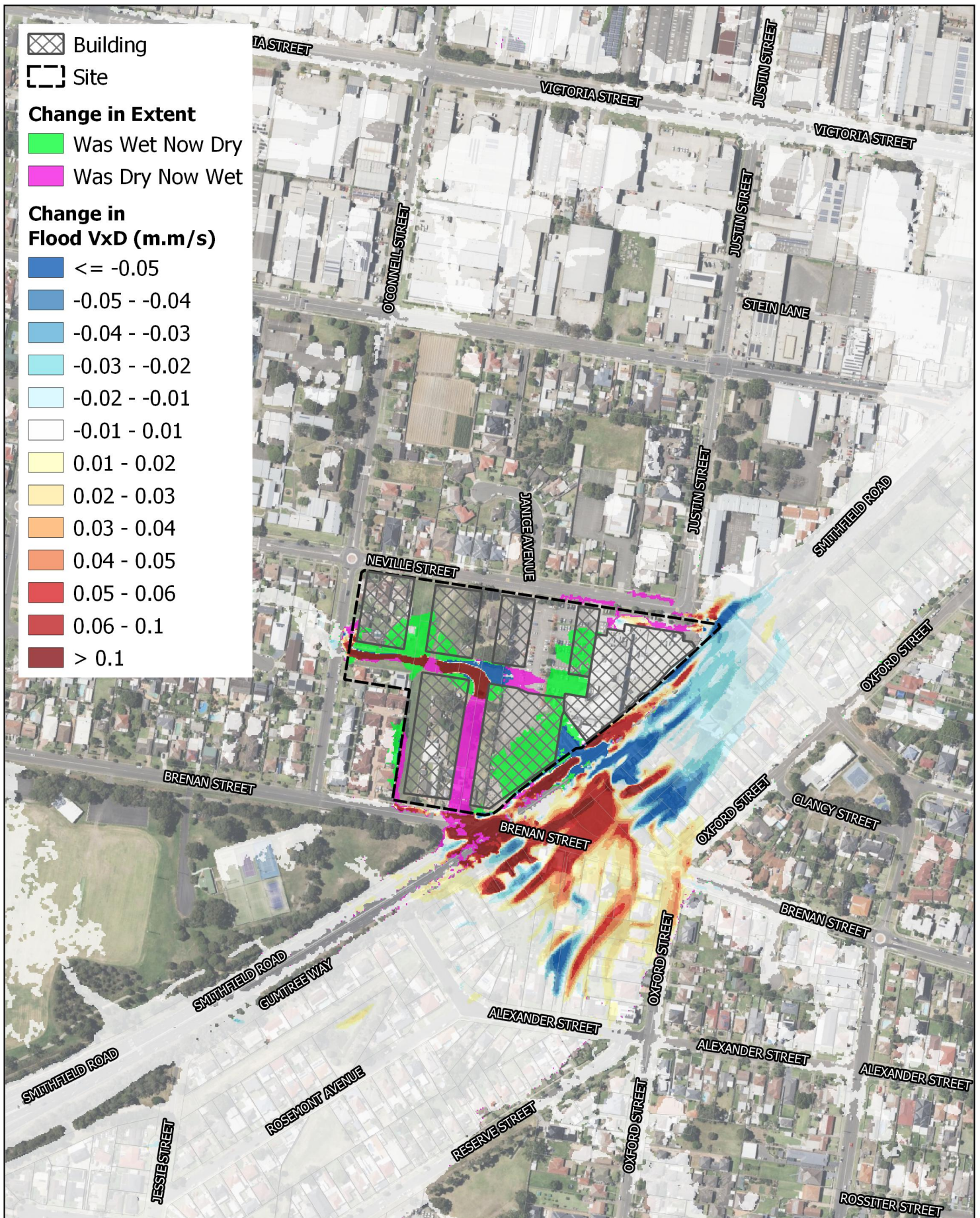
C-08

Rev:

-



www.bmt.org



Title:

Peak Flood VxD Impact - PMF Event

Drawing:

C-09

Rev:

-

BMT endeavours to ensure that the information provided in this map is correct at the time of publication. BMT does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



0 50 100 150 200 m



www.bmt.org